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This Week

Have you ever wondered how widely specification Diesel fuels were available and how much attention is being paid to them by the major refiners? We wondered too, and the survey which appears on page 114 gives most of the answers.

If the timing of two-stroke engines could be varied in accordance with their speed of operation, their output and fuel economy could be improved. The possibilities inherent in this statement have been explored by a German investigator, whose important findings are translated and edited on page 120.

Heavy "Big 3" Schedules

Week's Production of Motor Vehicles May Rise In Spite of Approaching Change-over Period

With the plants of two of the largest "independents" shut down and a half dozen other factories tailing off output of their 1936 lines this week, a sharp drop in the motor industry's production curve might have been expected. But as a matter of fact final production figures for the week will equal, and possibly exceed by a small figure, those of the previous period. Loss of output by some of the smaller plants has been more than compensated by heavier schedules on the part of the "big three" to make up for the setback suffered the week before, when excessive heat forced the closing of some plants for a few hours. Even the innate optimism of sales executives is being put to a severe test by the amazing persistent strength of retail demand. The buying urge of the public seems to be almost insatiable. If the present situation continues, the industry will be obliged to revise its ideas of seasonal trends.

Excessive heat and drought over wide areas of the country have been less of a depressant on sales than was expected, and offsetting these, better prices for crops are providing a stimulus in other regions. Dealers in the southeastern states, for instance, have been wiring their factories to rush additional shipments. Rising prices for tobacco and cotton are responsible for the unexpected demand from that zone. Used-car sales continue satisfactory in all parts of the country.

The end of this month will find production of 1936 models concluded in about half of the automobile plants, and by the middle of August all but two or three will have stopped their final assembly chains preparatory to retooling for the new lines. The manufacture of some of the parts going into current models has already been terminated by the big producers. Various plants will be changed over in turn as they finish work on present schedules. In this way actual stoppage of production will be cut to a minimum this year. One of the biggest factories is planning on making the changeover in less than two weeks. In all cases, four weeks is given as the maximum period for stoppage of assembly lines.

That many dealers will experience an actual shortage of new cars before 1937 models are announced is evident. Sales managers do not look upon this condition as an evil. Dealers, they say, will have time to make a more thorough than usual clean up of their used car stocks and will enter the new selling season in a stronger condition than ever before.

Labor Announces Program

United Automobile Workers Will Seek New Members By Promising Activity on Ten Points

The United Rubber Workers Union was among the sponsors to the letter by which John L. Lewis this week defied the council of the American Federation of Labor to bring to trial the Committee for Industrial Organization.

Actively mentioned as supporting the C.I.O., but apparently not represented at C.I.O. meetings this week, the United Automobile Workers Union is proceeding actively with the organization of workers in the automotive field.

The United Automobile Workers has absorbed several smaller independent groups within the last fortnight. Homer Martin, president of the U.A.W., has announced a ten-point program for which the union will contend. The program includes the following points:

1. An annual "living wage" of not less than $2,000 a year for all workers.
2. A quarterly bonus based on the earnings of the company employing.
3. A 30-hour week throughout the automotive industry.
4. Union control over "speed-up" programs.
5. "Job security," and application of seniority rules.
6. True collective-bargaining agreements.
7. Two weeks' vacation with pay for all workers.
8. Protection from individual hazards and occupational diseases.
9. Social and economic legislation favorable to workers.
10. "Independent political organization of workers."

The U.A.W. is sponsoring weekly broadcasts from a Detroit radio station and frequent meetings are being held in public parks in the Detroit area.

Rolls-Royce of America Assets to Be Bid Upon

Creditors of the Springfield Mfg. Corp., successor to Rolls-Royce of America, will meet in New York July 31, to consider an offer of $126,000 from Dallas E. Winslow, Inc., for assets of the Springfield corporation, and Brewster & Co., as subsidiary.

According to an advertisement of the referee in bankruptcy, other offers will be considered at the same time. Assets for sale include, subject to the consent of Rolls-Royce, Ltd., the right to use patterns, etc., and to assemble parts included in the inventory.

French Factories Face Restrictions

Car Prices May Rise 30 Per Cent to Meet Rise in Labor Costs; Many Plants May Be Nationalized

Faced with increased wages as the outcome of recent strikes, with a paid annual vacation of 15 days, and with the 40-hour week to be applied very shortly, French automobile manufacturers are now considering the reaction of these measures on selling price.

One of the leading manufacturing associations has announced that there will be no increase, for dealers' discounts will be diminished, and list prices will be enforced and there will be more uniform allowances for cars taken as trade-ins. Individually, however, manufacturers are not optimistic about holding prices at their present level, some predicting increases which will go as high as 30 per cent. All suppliers have announced increased prices, or have given notice that present prices cannot be maintained.

As a result of the obligation to give all workers a 15 days' paid vacation, it has been decided that all French factories shall close simultaneously for a couple of weeks during the month of August. This is the slackest period of the year and one during which many of the works were either totally or partially closed for stock taking.

If work has been resumed in all the automobile factories, Communistic tendencies still remain. In many shops the labor delegates openly announce that their aim is to take complete control. These extremists, however, are in a minority, and now that the government has announced that it will not tolerate strikes with the strikers in possession of the buildings, there has been a reaction against them.

The application of the law on Government possession of arms factories affects the automotive industry, for there are few factories which are not working, to some extent, on army contracts. A leading example is Hotchkiss, which has two factories under one financial control, one working entirely on arms and the other on automobiles. Even the automobile factory has a contract for tanks, which are delivered without guns or armor. Renault is interested in tanks and airplane engines. Hispano-Suize is 90 per cent on aviation engines. Citroen has a small department for military contracts and all the truck factories get some army orders.

Nash Buys Seaman

Expands 50 Per Cent of Stock Holding to Ownership

Stating that competition in the automobile industry permits only one manufacturer's profit, C. W. Nash, chairman of the board of Nash Motors Co., Kenosha, Wis., announced last Saturday the purchase of the Seaman Body Corp., Milwaukee, for a price reported to be $5,000,000. The automobile concern had owned half of the capital stock of Seaman since 1919.

The deal through which Nash becomes sole owner of the Seaman concern is said to be a major step in the expansion program on which Nash embarked several months ago. The Seaman company's entire business had been devoted to making bodies for Nash and Lafayette cars.

The purchase brings to a close one of the most unusual contracts in the history of the automobile business. It began shortly after Nash entered Kenosha, and had continued on a basis of friendship without a single written line to bind it.

Photo by Leopold from Domei. Exclusive to AUTOMOTIVE INDUSTRIES in the U. S.

Gas-Tight Ambulance

During aerial attack defense maneuvers held in Tokio on June 26, an ambulance car, specially designed for this purpose by the War Ministry, demonstrated its usefulness in emergency service. The body is completely gas tight. The carburetor is said to be equipped with a special device preventing poisonous gases from entering the combustion chamber and putting the engine out of commission.

Of more than passing merit is the first issue of **"Research Illustrated"*** newest publication of E. F. Houghton & Co., Philadelphia. In it are a half dozen special articles as well as other features which leave little uncovered on the subject of leather belting. Would you like your name put on the list?

"Pneumatic Equipment for Farm Tractors" by Alexander Hay is a recent publication of the Rubber Growers' Association, 19 Fenchurch St., London, England. Though the booklet describes the application of rubber tired tractors to farm work in England, practically all observations are from American university tests, and with American equipment. The booklet may be obtained direct from the publishers.

The U. S. Asbestos division of Raybestos-Manhattan, Inc., has recently issued the first of a series of **8-page supplemental service bulletins*** to all organizations which have registered their copies of the Grey-Rock Commercial Transportation Recommendations Guide. Would you like to be on the list?

"Spring"* is the title of an all-inclusive engineering data manual by the Wallace Barnes Co., Bristol, Conn. Data concerning weight, tolerances, temperature, resilience, load in lb. per in., materials used in manufacture are a few of the many subjects covered for practically all types of springs.

Auto-Bucherschau 1935, a book of reference covering all publications in German on motoring and related subjects such as fuels, road building, traffic matters, touring maps, etc., which appeared during 1935. The work was compiled by Dr. E. W. Boehme to the order of the German Automobile Manufacturers Association and is published by Verlag Klasing & Co. G.m.b.h., Berlin W 9.

Bonney Forge & Tool Works of Allentown are distributing two new catalogs*, No. 36 for jobbers and No. 136 for mechanics. The latter contains useful information concerning the **correct use of tools.**

"New Caterpillar Tractors"* (Diesel RD4 and Thirty) and its companion piece, "Caterpillar Diesel on the Farm" are recent publications of the maker. The former contains a complete description of the newest units in the line, while the latter describes many actual applications of Caterpillar products in farm use.

Of unusual practical value is a chart published by the Booth Felt Co., Brooklyn, N. Y. Actual samples of different **felt materials** are attached by spiral binding in the proper classification column, and individual applications are specified in each of various industries.

A Buyers Guide* to **Warehouse Stocks of Nickel Alloy Steels** has recently been issued by the International Nickel Co. Distributing companies are listed geographically, and the specifications available at each point are listed.

Allis-Chalmers leaflet No. 2224*, recently issued, covers the company's line of **single suction end centrifugal pump.** In addition to full construction details and specifications, the leaflet shows a number of typical combination drives.

A **"Symposium on Pearlitic Malleable Cast Iron** has been published by the

American Society for Testing Materials, Philadelphia, Pa. Almost unique in its field, the symposium covers the subject by a general introduction, a complete section on producers' data, and abstracts of important patents. Copies are available direct from the publishers. The price is 60c. each.

The **Link-Belt Co.** has recently published **catalog** No. 1557* which tabulates the company's complete line of cut tooth sprocket wheels, chain parts, and complete drive assemblies.

"An Improved Method for Preparing Cast-Iron Transverse Test Bars" by A. I. Krynitsky and C. M. Saeger, Jr. This is research paper No. RP880 published by the National Bureau of Standards, Department of Commerce, Washington, D. C. and is available from that source.

"Facts About Metal Polishing"* is the title of a booklet recently published by the Norton Co., Worcester, Mass., which leaves little unsaid about abrasives of every kind and description.

A complete description of the construction and application of **Fellows Red Liners** for checking spur and helical gears and hour-glass steering worms is contained in a leaflet* recently issued by the Fellows Gear Shaper Co., Springfield, Vt.

Full specifications concerning the Abart Gear & Machine Co. straight line **spur gear speed reducers** are contained in the company's latest bulletin, No. 1200.*

New Van Keuren **Light Wave Measuring Equipment** is described in Bulletin M21.* The equipment measures sizes, flatness and parallelism in one operation, and has a host of applications where measurements up to a millionth of an inch are desired.

* Available through AUTOMOTIVE INDUSTRIES.

Goodyear Wins Truce

Union Agrees to Terminate Sit-Down Strikes for Six Weeks' Period

Goodyear unionists have declared a six weeks' truce in the labor war with Goodyear management which has been producing almost daily sit-down strikes since early last spring. At a mass meeting of 3500 Goodyear unionist employees held at the Akron Armory July 19, union leaders were successful in quelling a move to force a showdown on the closed shop issue, and obtained unanimous vote of union members to place a ban on all "wildcat" or unauthorized sit-down strikes for six weeks. Union leaders announced after the rally that the armistice period would be used for the purpose of further negotiating with Goodyear, it being plainly indicated that the union's ultimate objective would be a closed shop.

The union action banning guerilla warfare and unauthorized sit-downs came after Mayor Schroy of Akron had issued an ultimatum to the effect that such unwarranted interruptions of production would not be further tolerated. Mayor Schroy declared he would place the entire Akron police force at Goodyear's disposal, if necessary, to enable the company to keep its factories operating without interruption.

Union officials declared Monday, July 20, that unionist Goodyear workers who violated the six weeks' sitdown truce would be dealt with severely.

"We are going to handle the whole thing as an organization and not as individuals or small groups," said E. E. White, Goodyear union secretary. "We expect to have just about everybody in Goodyear signed up by the union by September 1."

SLANTS

CLUTCH — *Numerous clutch faults are said to have been discovered in cars tested under Chicago's recent compulsory inspection law, so that beginning with January, clutches will be added to the mechanical components which must receive official OK from the employees of Edward G. Gorman, director of Chicago's motor-vehicle bureau.*

GUAYULE — *More than 100,000 acres in the Marathon region of Texas are being leased for the growing of guayule rubber for an unnamed tire manufacturer. Profitable source of latex, the guayule shrub was harvested formerly in ways which denuded fields. New methods will cut tops, leave the roots.*

MIDGETS—*Of 400 model airplanes in the National Model Airplane Meet, held in Detroit this year, many were powered with miniature gasoline engines (see: "A Miniature Engine for Model Planes", page 800, AUTOMOTIVE INDUSTRIES, Dec. 14, '35). Alert to markets, AC spark plugs were available, with the technical advice of Hector Rabezzana for the fractional-horsepower enthusiasts.*

SPARK PLUGS—*AC division of General Motors reports June brought largest replacement business of any month in company's 28 years.*

ARGENTINA—*U. S. manufacturers sold 92 per cent of the motor vehicles imported into Argentina in the first five months of 1936, but the total imports dropped 12.6 per cent, from 9960 units in the first five months of 1935 to 8709 in the same period of this year.*

ECONOMY—*Pontiac is proud that 10,400 owners participated in a national economy contest, recently concluded. Awards: a Pontiac 8, Pontiac 6 and 164 cash prizes. Average of contestants: 23.8 m.p.g.*

SAFETY—*Accident-prevention campaigns are gaining in their race with sudden death, according to Paul G. Hoffman, Studebaker's president, who pointed out to Automobile Manufacturers Association members at their annual meeting that accidents in 35 of 37 large cities are 11 per cent lower for June, compared with last June.*

USED CARS—*Buick dealers sold 12,304 used cars in the last 10 days of June, a record for any 10 days of this year, according to W. F. Hufstader, general sales manager. The June used-car stock was turned over in 27 days, reducing the inventory 1600 units to 25,030 on hand as of July 1. June ratio was 1.75 used cars sold to each new car delivered.*

GOLD CUP—*With restrictions on hulls removed and engine capacity jumped to 732 cu. in., with supercharging allowed, this year's Gold Cup motorboat classic will have eight entrants, four of them running newly built hydroplanes. Victor Kliesrath of Bendix, and Kaye Don were to be among the drivers.*

RAIL CARS—*A light-weight pneumatic tired rail car, with a cruising speed of 60 m.p.h. and a maximum of 70 m.p.h., is being tested under service conditions on British railways, according to the U. S. Department of Commerce. The new car is said to be 54 ft. long, to carry 56 passengers and 15 cwt. baggage, and to weigh 9½ tons on the rails.*

ANNIVERSARY—*Kenosha, Wis., will celebrate the twentieth anniversary of the founding of Nash Motors with a civic holiday July 29. The announcement points out that of 205 makes of cars current in 1916, 16 have survived.*

BRAKES—*A 1½-ton Ford truck, carrying a gross load of 22,000 lb., equipped with a 6-wheel Thornton tandem unit and Linderman brakes used with standard Ford drums, was able to stop in an average of 35 per cent less than the required legal stopping distance, in a series of tests conducted with the cooperation of the Detroit police department.*

SALT—*During the recent heat wave, physicians advised the public to sprinkle a little salt in their drinking water to compensate for that lost through the pores by perspiration. Employees of the Chevrolet foundry get their salt tablets from handy dispensers, thus avoiding heat cramps.*

SAFEAIR—*Private owners and air-cab operators using Stinson planes flew approximately 7,000,000 air miles without a fatality in the first six months of this year.*

Racing Records Protested

Claiming that the spirit of the rules had been violated, the Contest Board of the American Automobile Association has lodged a protest against the four world's records for 50 kilometers, 50 miles, 100 kilometers and 100 miles set up by Hans Stuck, on an Auto Union car, last March, over the automobile road between Frankfurt and Heidelberg. During these runs Stuck attained the average speed of 167.38 m.p.h. over a distance of 50 miles.

The international rules require all records up to 10 miles to be run out and home, or over a closed circuit, so as to cancel out the effect of the wind or the gradient. No restriction is made for distances of more than 10 miles, for when the rules were drawn up it was never imagined that a straightaway of greater distance would become available.

Germany now possesses automobile highways dead straight for 100 miles, and Stuck took advantage of these conditions to capture four world's records from the Englishman, G. E. T. Eyston. The Contest Board claims that this was an unfair advantage.

By reason of this protest the records have been suspended pending a decision of the International Sporting Commission at its meeting in the autumn.

Aeronautical Exports Drop

But Number of Engines and Their Value Rises In First Five Months of This Year

Exports of Aeronautical products for the 5 months ending with May 31 were 17 per cent less in value than those for the first 5 months of 1935, according to the Department of Commerce. The details of the 5-months' period are tabulated below:

5 Mos. of Year	Planes Units	Planes Value	Engines Units	Engines Value	Parachutes Value	Parts Value
1936	149	$2,540,975	265	$1,258,395	$141,675	$1,840,203
1935	168	4,302,953	210	733,559	27,695	1,925,319
'36 as % of '35	88.7%	59.1%	126.2%	171.5%	511.2%	95.5%

Parker Develops Process For Coating Zinc Casting

Parker Rust-Proof Co., Detroit, Mich., has announced the development of a new process for coating zinc alloy die castings which are to be painted or lacquered. Bonderite Z, as the new process is called, produces an insoluble crystalline phosphate coating which is said to provide resistance to corrosion and form a good paint adherent surface.

In addition to the usual cleaning and rinsing facilities, the only special equipment required is a heated tank of proper size, with suitable baskets or trays. No electric current is required as this process is one of immersion in which the parts are held in the tank for ½ to 3 minutes.

Auburn Cuts Loss

Auburn Automobile Co. reported for the quarter ended May 31 a net loss of $145,724 against a net loss of $703,564 in the preceding quarter and a net loss of $410,890 in the 1935 quarter. For the half year the net loss was $849,288 against $862,487 for the like six months of the preceding year.

Russell Declares Dividend

Russell Motor Car Co., Limited, Toronto, Ont., has declared the regular dividend of $1.75 a share on the 7 per cent preferred stock, plus $1 a share on arrears. It is payable Aug. 1 to shareholders of record July 20. This makes $4 a share paid on arrears. Arrears are now only $2 a share.

The company's earnings are obtained from stock holdings in Willys-Overland of Canada, Canadian Acme, and Canadian Cycle.

Eyston Sails for England

Captain George Eyston sailed for England July 23, with more than 20 world's speed records in his pocket, most of them made in the week of July 6-13 at the Bonneville Salt Flats.

Gasoline Consumption Rises

Daily average gasoline consumption for the month of April, 1936, was 8.99 per cent above that for March, according to the American Petroleum Institute. The April figures omit New Jersey.

Average consumption for the first four months of this year was 7.40 per cent better than for the same period of last year. The April estimate was 1,486,633,000 gal. for 47 states and the District of Columbia.

Technical Education

International Congress to Be Held At Rome, Dec. 28-30

The International Bureau for Technical Education, 2 Place de la Bourse, Paris (2°), France, gives notice that in accordance with resolutions adopted by the Barcelona Congress in 1934, the next International Congress on Technical Education will be held at Rome Dec. 28-30, 1936. Persons who wish to become members of the Congress must file their application before Nov. 15. The membership fee is 25 lira or 30 French francs. At the close of the Congress the proceedings will be published by the Organizing Committee and copies will be sent to all members who ordered them in advance, the cost being 40 lira. Among the topics to be dealt with at the Congress are the following: Technical Education and Economic Life; Vocational Guidance and Its Continuation; Special Training for Workshop Instructors, and the Training of Women for their Special Place in Economic Life. The official languages of the Congress will be French and Italian.

Honda Improves Magnet Steels

Japanese Professor Adds New Members to K.S. Series of Quinary Iron Alloys Originated in 1916

By Herbert Leopold (Tokyo)
Special to Automotive Industries

Professor Kotaro Honda, president of the Tohoku Imperial University and one of the most distinguished metallurgical scientists of Japan, has developed four new types of magnet steel, all possessing more desirable properties than the K.S. steel which was discovered by him in 1916 and which won him world-wide fame. Japanese patents Nos. 111703, 111704, 111705 and 111706 have been granted him on these steels, which are an improvement on his former invention and less expensive.

Dr. Honda's K.S. magnet steel is a quinary iron alloy containing 0.7 to 1.0 per cent carbon, 6-8 per cent tungsten, 1-2 per cent chromium and 20-36 per cent cobalt. It has a remanent induction of 12,000-8000 gauss and a coercive force of 200 to 250 oersteds. Because of its much greater magnetic strength than that of the conventional tungsten steel, it has found wide application in electrical instruments and machinery, including electric ignition magnetos. Its one weakness is its high cost.

The first group of new magnet steels, which, owing to the limited use of rare and expensive metals, are expected to be considerably cheaper than K.S. steel, contains 3-50 per cent nickel, 1-50 per cent titanium, 1-60 per cent cobalt and

Sir Malcolm Campbell (left) explains his latest invention —"the claw of the law." Fitted on police cars it can be maneuvered from within the car to grab the bumper or spare tire of a vehicle ahead

less than 50 per cent manganese or tungsten or both, the rest being iron. Ferro-titanium may be used instead of titanium. Some specimens having a chemical composition within the above range have a magnetic induction of 6100 to 8100 gauss and a coercive force of 650 to 750 oersteds.

The second group, which has similar properties, contains 3-50 per cent nickel, 1-50 per cent titanium, 1-60 per cent cobalt, and less than — per cent aluminum, or copper, or silver, or two of them in combination.

The third group is called nickel-titanium steel and consists of an iron alloy containing one or more of the following four elements: Manganese, vanadium, molybdenum and tungsten, the aggregate content of these elements not exceeding 20 per cent. The fourth group, which is also a kind of nickel-titanium steel, contains one or more of the elements—silver, copper, aluminum and arsenic—within the limit of 20 per cent.

R. KAREY has been appointed chief engineer of the outboard-engine division of the Bendix Marine Products Co., South Bend. With the Johnson Motor Co. for 10 years, Mr. Karey is experienced with marine, Diesel, and two-cycle engines.

FRED C. PYPER has been appointed general master mechanic of the Buick Motor Car Co. to fill the position made vacant by the death, July 4, of A. T. Brabyn. Mr. Pyper joined Buick in 1916 as foreman of tool grinding in the engine plant.

ROGER E. MITCHELL, general tool supervisor at Buick, succeeds Mr. Pyper as assistant master mechanic. He joined the organization as a tool designer, and is also a veteran of 20 years' service.

E. M. SCHULTHEIS has resigned his position with the Detroit office of the Automotive Division of the Timken Roller Bearing Company to join the staff of the Clark Equipment Company of Buchanan, Michigan.

WILDER GUTTERSON, for the last 10 years sales manager of the automotive division of the American Cable Co., has joined Ryerson & Haynes, Inc., Jackson, Mich., manufacturers of tire covers and jacks. He will have charge of the New York office.

FOWLER McCORMICK and **ARNOLD B. KELLER** have been elected to membership on the board of directors of International Harvester Company. Mr. McCormick is second vice-president of the company in the charge of foreign sales. Mr. Keller is treasurer.

Packard Earnings Jump

Packard Motor Car Co. has reported for the first six months of this year net earnings of $3,520,128 (about 24 cents a share), compared with $290,460 (less than 2 cents a share) for the corresponding period of 1935.

Advanced by Buick

Pyper **Mitchell**

See: "MEN"

Teachers Graduate

General Motors Institute Trains Preceptors for Automobile Schools

Forty-two teachers of automotive mechanics in high schools and colleges from 17 states including two provinces of Canada will be graduated tonight from a special four-weeks training course at the General Motors Institute in Flint, Mich., according to an announcement made yesterday by Major Albert Sobey, director of the institute.

The course marks the fourth year that the training has been scheduled, with every year showing an increased attendance. Last year teachers from 25 states and Canada were enrolled. The training includes a study of car specifications and adjustments; shop methods and procedure; service operations and equipment, and vocational guidance information. The training also has been suppelemented by visits to automobile plants and the various research laboratories of General Motors.

A second, identical session of four weeks will open July 27 and will extend through Aug. 21.

Studebaker Names 82 Dealers

Studebaker signed 82 new dealers in the United States in the month of June, according to an announcement from George D. Keller, vice-president in charge of sales for the corporation.

Fisher Guild to Convene

The sixth convention of the Fisher Body Craftsmen's Guild will be held in Cleveland, Aug. 26-29, in connection with the Great Lakes Exposition, now in progress.

The Consumer Market Data Handbook, 1936, is a noteworthy publication of the Bureau of Foreign and Domestic Commerce, Department of Commerce. Population and sales data are given for states, counties, cities and rural districts, as well as recapitulations for urban and rural areas. Available from the bureau at 50 cents per copy.

Motor and Equipment Wholesalers Ass'n has issued a preliminary **Analysis of the Price Discrimination Act** (The Robinson-Patman Bill) which explains the purpose and scope of the Act, and in addition comments upon its probable effectiveness as applied to the wholesale automotive trade. Available direct from the Association, 400 W. Madison St., Chicago.

Miller, Hibbard Join American Bantam Co.

T. L. Hibbard **R. S. Evans** **H. A. Miller**

Harry A. Miller, celebrated designer of racing cars and engines, and Thomas L. Hibbard, formerly of Hibbard and Darragh, Paris, designer of automobile bodies, have joined the American Bantam Car Co., Butler, Pa. Both have been elected vice-presidents of the company, according to an announcement from R. S. Evans, who heads the re-vamped organization succeeding the American Austin Company.

Secretary of the new company is Peter Beasley, president of Detroit Aircraft. The treasurer is Martin Tow, of Buenos Aires, and all of the foregoing, with Gilbert W. Klinch, Buffalo brewer, make up the directorate.

For 1937 the company plans production of a line of passenger cars, including a sports speedster, and a quarter-ton delivery unit.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES

There was a moderate improvement in general business last week featured by gains in the production of electricity and in steel output. Despite the drought, the volume of retail trade was from 12 to 15 per cent above that in the corresponding period last year, while wholesale trade also showed a substantial gain. Heavy rains fell in the western Mountain States and in parts of the Great Plains, relieving the serious drought conditions; but in some sections of Montana and Wyoming the rain came too late to save the crops.

CARLOADINGS RISE

Railway freight loadings during the week ended July 11 totaled 742,324 cars, which marks an increase of 74,565 cars above those in the preceding week, a gain of 158,822 cars above those a year ago, and a rise of 120,132 cars above those two years ago.

Electricity Production Peaks

Production of electricity by the electric light and power industry in the United States during the week ended July 11 was 14.9 per cent above that in the corresponding week last year and was the highest on record.

Department Stores Gain

According to the Board of Governors of the Federal Reserve System department store sales during June were 1 per cent above those in May and 15 per cent above those in the corresponding month last year. The current adjusted index stands at 89, based on the 1923-25 average as 100, as compared with 88 for May.

Construction Awards Up

Construction contracts awarded in 37 eastern States during June, according to the F. W. Dodge Corp., amounted to $233,054,600, as compared with $216,070,700 during the preceding month and $148,005,200 a year ago. New home construction was at the highest level since May, 1931.

Oil Production Up

Average daily crude oil production during the week ended July 11 amounted to 2,947,700 barrels, as compared with 2,892,300 barrels the week before and 2,715,100 barrels a year ago.

Price Index Falters

Professor Fisher's index of wholesale commodity prices during the week ended July 18 stood at 83.3, as against 83.8 the week before and 83.1 two weeks before.

Gold Stock Gains

The consolidated statement of the Federal Reserve banks for the week ended July 15 showed no changes in holdings of discounted bills, bills bought in the open market, and government securities. Money in circulation declined $52,000,000, and the monetary gold stock increased $7,000,000.

Willys Reorganization Pushed

Early action on reorganization of the Willys-Overland Co. is anticipated as a result of permission given by Judge George P. Hahn in Federal Court this week, for Empire Securities, Inc., to intervene in the Willys-Overland proceedings.

Empire Securities in its petition stated it now controls 70 per cent of the outstanding first mortgage bonds, 90 per cent of mechanics' liens, 95 per cent of unsecured claims and 91 per cent of indebtedness of Willys-Overland, Inc., a subsidiary.

It is anticipated that a reorganization plan will be laid before Federal Court by Empire Securities within the next two weeks. Ward M. Canaday, president of United States Advertising Corporation and long an associate of the late John N. Willys, is president of Empire Securities.

George W. Ritter, attorney, conferred with the Lucas County Board of Tax Revision today to explain a compromise settlement of the $790,000 delinquent tax lien against the Willys-Overland property. Details were not revealed but county officials indicated confidence in the outcome of the reorganization. It is understood that not all of the Willys-Overland physical properties will be used in the new manufacturing arrangement.

David R. Wilson, trustee for the property and president of Willys-Overland, said today he hoped to make at least 60,000 cars next year.

Under recent authorization of Federal Court he has placed orders for new tooling and dies amounting to $400,000 for the new 1937 model. Roomier body, with standard tread, retaining same engine is planned.

Goudard Reports Tour

Tells French Engineers America Lacks Notable Trends

French engineers were advised by M. Maurice Goudard to take out patents in the United States, even if it does not seem possible to exploit them immediately. In addressing a mass meeting of engineers at the Théatre des Ambassadeurs, Paris, Monsieur Goudard, who is president of the (French) Society of Automobile Engineers and of Solex Carburetors, pointed out that four-wheel brakes and independent-wheel suspensions used in the U. S. are of French origin and that the exchange of ideas is not handicapped by tariffs and quotas.

Fresh from a world tour, during which he spent considerable time in Japan and the United States, the speaker found the American automobile industry "prosperous, but lacking in notable trends".

Japan, he found, with motor-vehicle production averaging around 35,000 units a year, faces a shortage of highways. Use of automobiles is restricted largely to the cities, and traffic in some of them is very dense, he pointed out.

Skilled automotive labor in Japan is paid 10 cents an hour, according to Monsieur Goudard, and the wages of a good engineer come to the equivalent of $56 a month. There is a growing local machine-tool industry, and the factories are well equipped, mostly with American machine tools. Layout of the factories is simple and overhead charges are low.

40 Years Ago

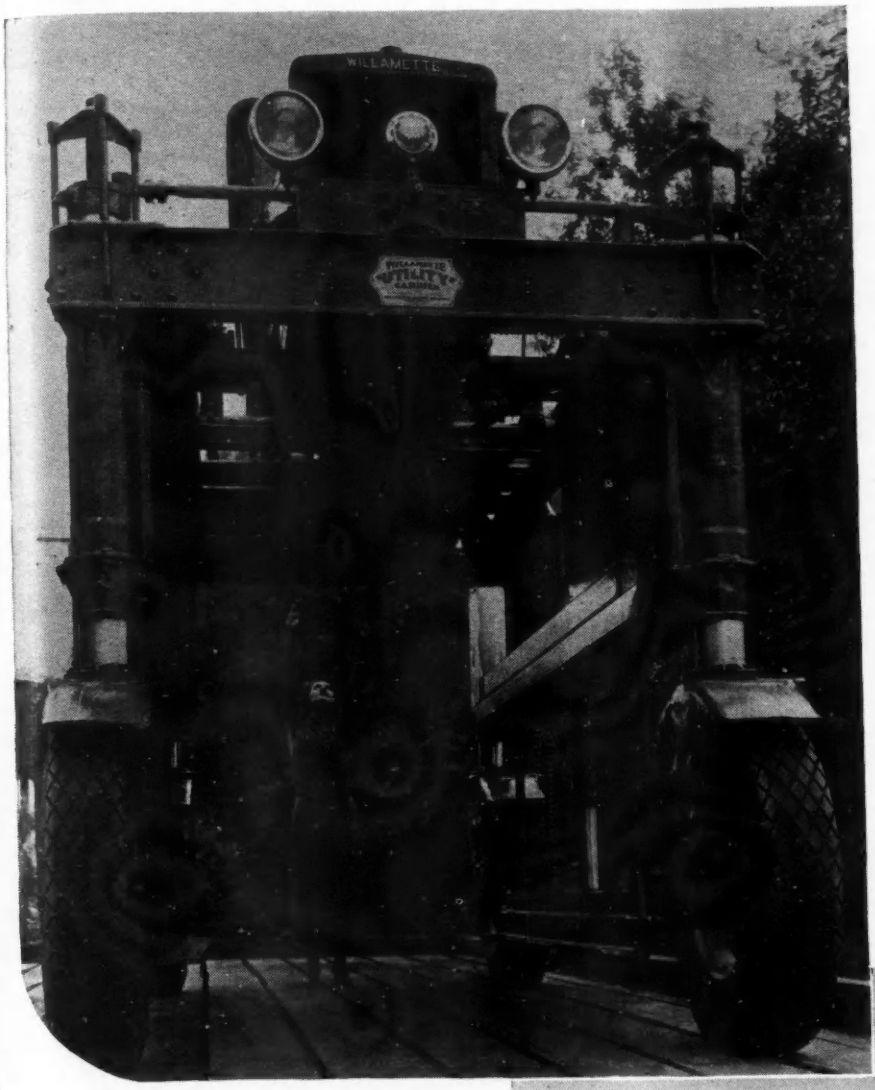
—with the ancestors of AUTOMOTIVE INDUSTRIES

Crosby Bros., U. S. Mail contractors operating the Haymond and Ft. Stockton stage line in Texas, are among the owners of Western stage routes who are waiting impatiently for a practical motor stage to appear.

Octave Chanute, of Chicago, formerly president of the American Society of Civil Engineers, has recently made a test of a model flying machine illustrating the principle of balance or safety in flight which he has been engaged in elaborating. . . . He will now proceed to build a larger machine, propelled by a motor of his own invention.

The authorities of the town of Greenwich, Conn., have taken a stand against the motor carriage. Several carriages which passed through there lately frightened the staid old country plugs of Greenwich to such an extent that the prosecuting attorney interfered and forbade the operators from again venturing within town limits.—From *The Horseless Age*, July, 1896.

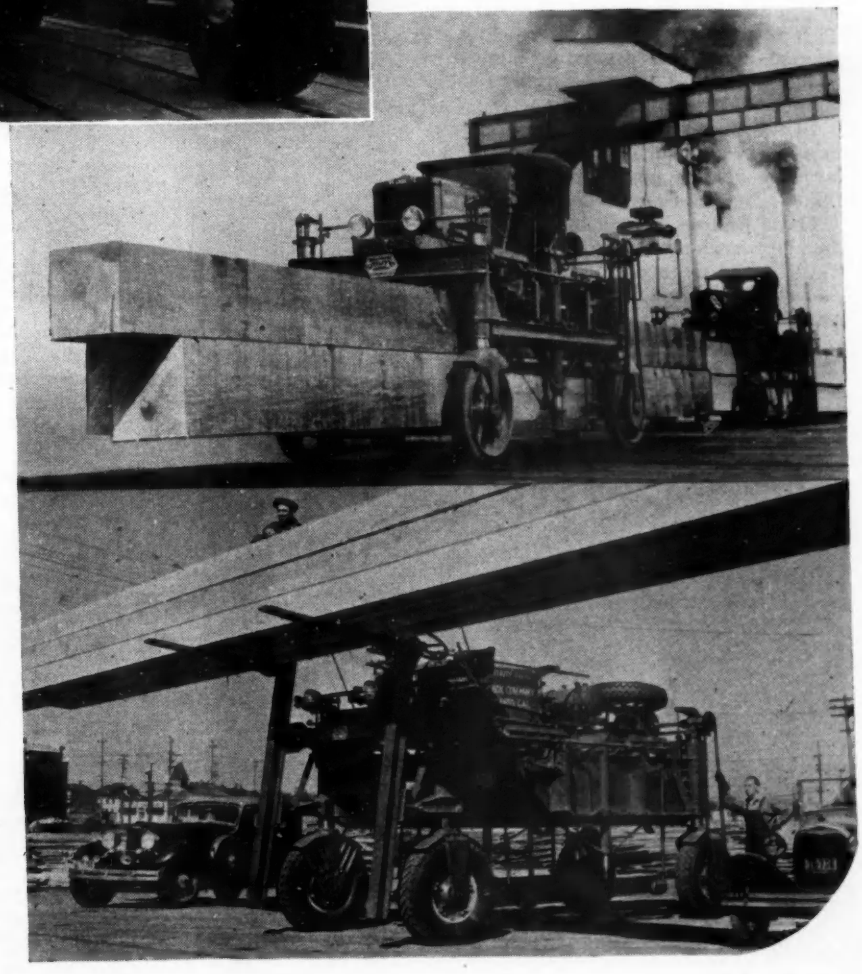
The WORLD on WHEELS



The load hoists of the Utility Carrier are operated by positive screw lifts. Screwed down instead of up, they act as vehicle jacks. Coil springs in the four corner posts are supported by anti-friction bearings and cushion the load.

Up to 15 tons are self-loaded and self-unloaded by the Carrier. Extreme maneuverability is attained by four-wheel steering as well as four-wheel hydraulic brakes. Note the chain drive to the rear wheels.

The Front Lift is the latest accessory for the Carrier, and enables it to lift heavy loads as high as the entire vehicle for stacking purposes.



IT is a common sight around saw mills in the Pacific Northwest to see this utility carrier, as it is called, straddle a pile of lumber weighing several tons, pick it up by the cross bars or bolsters on which it rests, and hustle it off to some other part of the plant. The pace of the carrier is as fast as that of an ordinary truck making as high as 50 m.p.h., and its four-wheel steering makes it far more maneuverable in crowded quarters. Coupled with the fact that the carrier is both self-loading and self-unloading, it is easy to understand why its use is being extended to other fields.

The carrier may be operated forward or backward with equal facility, as it is provided with full reversing transmission, three speeds forward and three speeds backward, unique among automotive vehicles. The turning radius is 9 ft. to center line of inside wheels and is made possible by the four-wheel steering principle and the fact that the wheels are mounted directly under the corners of the frame, instead of outside of it.

Canadian Production Lagging

Department of Commerce Figures for First Six Months Establish Gains in American Totals

Factory sales of motor vehicles reached 454,487 units for U. S. plants and 16,400 for Canadian plants in the month of June, according to final figures released by the Department of Commerce. For the first six months of this year factory sales from U. S. plants totaled 2,490,408 as compared with 2,218,255 for the first six months of 1935. In Canada, six months' production was 105,948, compared with 111,273 for the first six months of 1935.

NUMBER OF VEHICLES (Including Chassis)

Year and Month	UNITED STATES (Factory Sales) Total (All Vehicles)	Passenger Cars Total	Passenger Cars Domestic Market	Passenger Cars Foreign Markets	Commercial Cars, Total	CANADA (Production) Total
1936						
January	364,004	298,274	280,968	17,306	65,730	13,302
February	287,606	224,816	204,681	20,135	62,790	13,268
March	420,971	343,523	323,238	20,285	77,448	*18,021
April	502,775	417,133	395,182	21,951	85,642	24,951
May	460,565	385,507	365,457	20,050	75,058	20,006
June	454,487	376,641	357,651	18,990	77,846	16,400
Total (6 Mos.)	2,490,408	2,045,894	1,927,177	118,717	444,514	105,948
1935						
January	289,728	227,554	210,806	16,748	62,174	10,607
February	332,231	273,576	257,044	16,532	58,655	*18,115
March	425,913	359,410	335,674	23,736	66,503	*21,981
April	452,936	387,158	367,538	19,620	65,778	24,123
May	361,107	305,547	285,676	19,871	55,560	20,702
June	356,340	294,182	276,511	17,671	62,158	15,745
Total (6 Mos.)	2,218,255	1,847,427	1,733,249	114,178	370,828	111,273
Total (Year)	3,946,934	3,252,244	3,041,877	210,367	694,690	*172,877

G. M. Overseas Sales Pass June Mark for '35

Sales of General Motors cars and trucks to dealers in the overseas markets during June totaled 26,794 units. This volume was 11.6 per cent over the volume in the corresponding month of last year, and 13.6 per cent under the volume in May of this year.

In the first six months of 1936 sales totaled 173,473 units, representing an increase of 19.5 per cent over sales of 145,161 for the first six months of 1935.

These figures include the products of the corporations American, Canadian, English and German factories sold outside of the United States and Canada. American-source sales of Chevrolet, Pontiac, Oldsmobile, Buick, LaSalle and Cadillac vehicles reflected substantial gains in practically all of the 104 countries comprising the overseas market.

Plans Opening Sept. 1

Braddock-Eastlake, Ltd., Windsor, Ont., expects to have plant in production about Sept. 1. Main revenue will be derived from the metal stampings for Windsor automobile manufacturers.

Air Progress to Be Marked

Air progress programs will be held throughout the nation in the period from Sept. 1 to Oct. 10, according to the National Aeronautic Association, which is sponsoring them.

Evans Gets White Order

Evans exhaust ventilation will be standard equipment on all White trucks, according to the terms of a contract signed last week between the Evans Products Co. and the White Motor Co. The device will be applied to current models, as well as to the 1937 line.

Champion Adds Space for Research

A two-story addition to the engineering building, providing an increase of 13,200 sq. ft. of floor space is under construction for the Champion Spark Plug Co. The new space will go to the research department.

Facts and Figures Published

The 1936 edition of "Automobile Facts and Figures," issued by the Automobile Manufacturers Association, was distributed this week. In the 96 pages of the new issue are found important statistics of the automotive industry as of Jan. 1 of this year. An interesting feature of the pamphlet is a section devoted to the highway safety movement sponsored by the Automobile Manufacturers Association, which gives prominent repetitive display to the slogan, "It's Smart to Drive Carefully."

Company Changes Name

Chain Products Co., Cleveland, has changed its name to the Hodell Chain Co. in order to associate the corporate title with their products which are branded "Hodell Chains."

A.S.I. Show Space

Applications Mailed, Must Be Returned by August 10

Space application blanks for the Automotive Service Industries Show to be held in the Navy Pier, Chicago, Dec. 9-13 inclusive, have been mailed to all manufacturer members of the National Standard Parts Association and Motor and Equipment Manufacturers Association from the office of Show Manager A. B. Coffman, Chicago.

An Aug. 10 dead line has been set for final receipt of space applications to be allowed first choice of space.

Drawings will be in the Sherman Hotel, Chicago, Sept. 11. In the first drawing will be included the names of concerns whose applications for space are received in the show manager's office by Aug. 10. Included in the second drawing will be applications received after that date plus those of manufacturers who have not exhibited at a previous A.S.I. show.

Transmission Option on Ford

At an addition of $5 to the list price of commercial units the Ford Motor Co. is offering a transmission which is said to increase pulling power 30 per cent in low gear and 18 per cent in intermediate. On the new transmission, known as the "67," third speed is direct drive as on the standard transmission.

N.S.P.A. Index Up

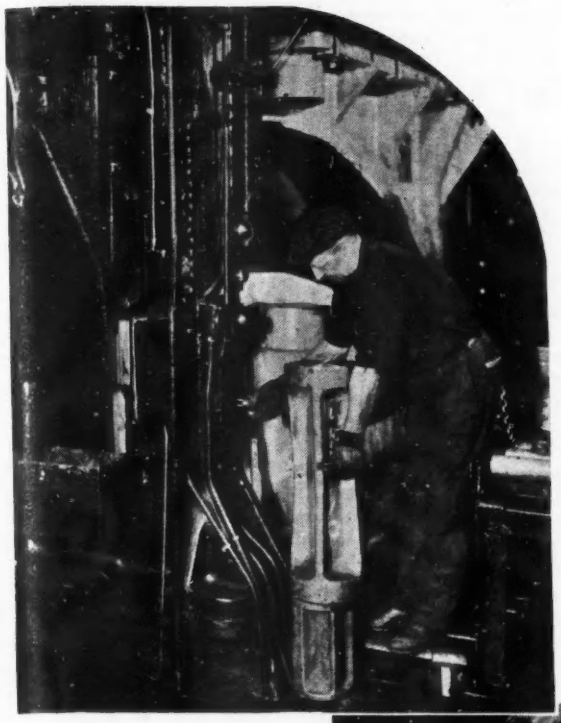
Shipments of All Types of Equipment by Members Gained in June, Association Reports

The index number for shipments of original equipment to vehicle manufacturers by member companies of the National Standard Parts Association stood at 174 for the month of June, compared with 172 for May, 126 for the month of June, 1935. For the first six months of this year the index number was 187, compared with 143 for the first six months of 1935. The index numbers in the original equipment and other categories tabulate as follows:

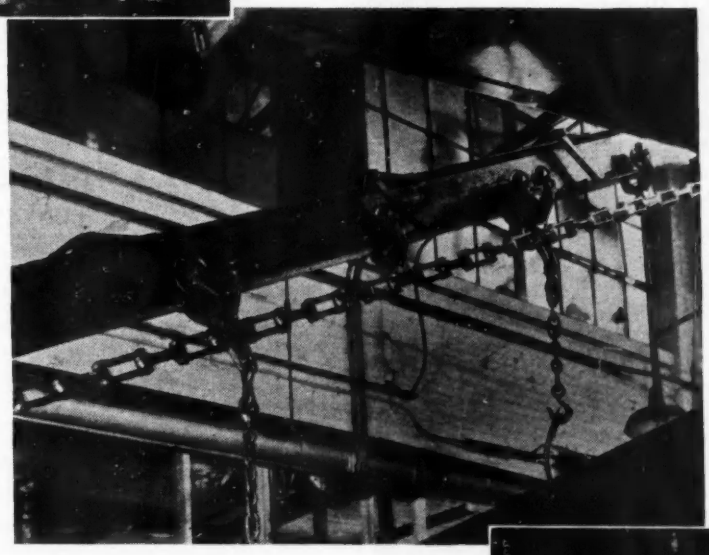
(Average Monthly Sales 1934 = 100)	June 1936	May 1936	June 1935	6 Months 1936	6 Months 1935
N.S.P.A. Automotive Sales Index	152	138	114	134	111
Replacement Parts Shipped to Wholesalers	148	127	112	119	103
Service Equipment and Tools Shipped to Wholesalers	143	140	107	138	109
Original Equipment Shipped to Vehicle Manufacturers	174	172	126	187	143

Safety Spots

At Chevrolet



Safety regulations require that a safety block be inserted whenever an employee must work between the dies. This block is of Dow metal and though it weighs but 40 lb. is many times stronger than wood. The electric plug, chained to the block, must be inserted befo e the power can be turned on.



The engine conveyor line carries a load of many tons. Where it goes from one floor to another, these automatic safety pawls, mounted on the I-beam support, prevent mishap should the chain be broken.

The operator of this massive trimming press, which removes excess metal f om the edges of Chevrolet fenders and then forms the edge into a rounded channel, is prevented from getting too close to the descending head of the machine by a strong metal guard.

Even minor accidents are prevented at Chevrolet by devices such as the steel shield shown here mounted on a punch press. The shield prevents the hand from getting too close as well as deflecting metal chips.

Automotive Metal Markets

Steel for New Car Models Expected to Be In Demand Beginning With Middle of August

Takings of steel by automotive consumers continue to exceed the expectations of producers. Some of the latter see in the purchase of odd lots for new model production try-outs and the somewhat more active demand for bar stock from some parts makers, indications that there will be virtually no gap between the buying of steel for current models, which continues at a relatively high rate, and the initial stages of the buying movement that is looked for from the introduction of new models.

A prominent steel company executive predicted this week that steel orders for new models would begin to come through by the middle of next month.

The tonnage entailed in individual commitments is relatively light, but in the aggregate they make up a reassuring backlog, this all the more so as most of the finishing mills catering to automotive consumers had become reconciled to the thought of having to pare operations sharply during the second half of July.

Flat steel production makes an especially good showing and, although perhaps somewhat more of the output than formerly is for miscellaneous industrial uses, it is the continuance of automotive demand that is chiefly responsible.

Pig Iron—Most of the Middle West markets are draggy. Automotive foundries have sufficient reserves to provide them with what iron they need for current melts. The market is unchanged.

Copper—Early this week the impression became general in the copper market that the price of the red metal would be advanced before long. As a result, domestic consumers came into the market and on Monday contracted for 15,000 tons, and the export price jumped to the highest level since May. On Tuesday leading producers marked their price up ¼c, the market generally becoming 9¾c delivered Connecticut.

Tin—The London market staged another sharp advance on Monday, lifting the price for spot Straits tin here from 43.20c, to which it had receded at the close of the preceding week, to 44¼c. Consumers turned their backs on the market, preferring to await news of further developments regarding production control measures.

Lead—Quiet and firm.

Zinc—Steady.

Government Contracts

Walsh-Healey Act to be Effective Beginning Sept. 28

Apparently the motor industry will be but little affected by the Walsh-Healey government-contract act, which Secretary of Labor Frances Perkins has announced will become effective Sept. 28.

In setting forth organization plans for administration of the act by the Department of Labor, Miss Perkins has given liberal interpretation of the provisions of the act and declared that the rights of manufacturers and contractors will be thoroughly respected and their cooperation invited.

Broadly, the act requires that a contractor, in order to get federal business must be a manufacturer or a regular dealer and that employees engaged in the work under contract will not be employed for longer than eight hours a day or 40 hours a week. However, the Secretary of Labor is authorized to allow reasonable limitations, variations, tolerances and exemptions with payment for overtime. The motor industry is said to average slightly over the 40-hour week but is so near that average that it is assumed allowance would be duly made for overtime work. On minimum wages, the industry of course greatly exceeds requirements with its average of 77 cents per hour, the highest wage average of any of the major industries. The act requires the Secretary of Labor to ascertain minimum wages prevailing in the locality in industries or groups of industries performed in government contract work.

Should the motor industry find, however, that rules and regulations, to be promulgated shortly before the act becomes effective, are onerous, it is thought that it might turn to dealers and do business through them with the government. This would automatically relieve the industry of responsibility of adhering strictly to the terms of the act. The dealer of course would have to do so.

Tire Shipments, Production Gain

Shipments of pneumatic casings during May were estimated at 5,831,964 units, an increase of 19 per cent above April and 43.4 per cent above shipments made in May, 1935, according to statistics released by the Rubber Manufacturers Association, Inc.

Production of pneumatic casings for May totaled 4,970,993, according to similar estimates, which is an increase of 2.4 per cent over April and 19.1 per cent above May, 1935.

Head of Rolls-Royce Dies

Baron Wargrave, 73, chairman of Rolls-Royce, Ltd., died July 17 in London.

Calendar of Coming Events

SHOWS

Automobile Salon, Oriental Fair, Lwow, Poland .....Sept. 5-15
International Automobile Section, 7th Levant Fair, Bari, Italy .....Sept. 6-21
30th Automobile Salon, Paris, France, Oct. 1-11
Olympia Motor Show, London, England, Oct. 15-24
Czechoslovakia, 26th International Automobile Exposition, Prague....Oct. 16-25
9th International Automobile Salon, Milan, Italy .....November
National Motor Truck Show (N. J. Motor Truck Assn.), Newark, N. J., Nov. 3-7
National Automobile Show, Grand Central Palace, New York .....Nov. 11-18
International Aviation Show, Paris, France .....Nov. 13-29
Boston Automobile Show.....Nov. 14-21
Columbus Automobile Show.....Nov. 14-20
Chicago Automobile Show.....Nov. 14-21
Detroit Automobile Show.....Nov. 14-21
Washington, D. C., Automobile Show, Nov. 14-21
Cincinnati Automobile Show....Nov. 15-21
St. Louis Automobile Show.....Nov. 15-22
Brooklyn Automobile Show.....Nov. 21-28*
Cleveland Automobile Show.....Nov. 21-28
Kansas City Automobile Show..Nov. 21-29*
Milwaukee Automobile Show...Nov. 22-29
Baltimore Automobile Show.Nov. 26-Dec. 5
28th Automobile Salon, Brussels, Belgium .....Nov. 28-Dec. 9
Peoria Automobile Show....Nov. 30-Dec. 5*
Philadelphia Automobile Show, Nov. 30-Dec. 5*
Natl. Exposition of Power & Mechanical Engineering, Biennial Meeting, New York City .....Nov. 30-Dec. 5
Automotive Service Industries Joint Show, Chicago .....Dec. 9-13

* Tentative dates.

CONVENTIONS AND MEETINGS

Mid-Summer Convention of Automotive Trade Association Managers, Montreal, Que. .....July 28-30
National Association Power Engineers, Annual Meeting, Chicago, Aug. 31-Sept. 4
American Chemical Society, Semi-annual Meeting, Pittsburgh, Pa., Sept. 7-12
World Power (Fuel) Conference, Washington, D. C. .....Sept. 7-12
Annual Meeting and Convention of the National Association of Sales Finance Companies, Hot Springs, Va. .....Sept. 14-16
American Transit Association, Convention, White Sulphur Springs, W. Va. .....Sept. 21-24
North American Gas Tax Conference, Richmond, Va. .....Oct. 6-9
First Aircraft Production Meeting of the S. A. E., Los Angeles...Oct. 15-17
Annual Meeting of the National Association of Motor Bus Operators, Detroit, Mich. .....Oct. 15-16
American Society for Metals, 18th Nat'l Congress, Cleveland, O.....Oct. 19-23
16th Annual Meeting of the American Welding Society, Cleveland, O., Oct. 19-23
American Gas Association, Annual Meeting, Atlantic City.....Oct. 26-31
American Petroleum Institute, Annual Meeting, Chicago.....Nov. 9-12
National Foreign Trade Convention, Chicago .....Nov. 18-20
Natl. Industrial Traffic League, Annual Meeting, New York City.....Nov. 19-20

CONTESTS

100-Mile National Championship, New York State Fair, Syracuse....Sept. 12
First Annual 400-Mile International Sweepstakes, Roosevelt Raceways, L. I. .....Oct. 12
500-Mile International Sweepstakes, Los Angeles Raceway .....Nov. 29

Just Among Ourselves

Japanese Are On Their Way

OUR correspondent in Tokyo has written that several Japanese distributors of American automobiles have sailed recently for the United States in an attempt to obtain licenses to manufacture or assemble American cars in Japan. Checking in Detroit has failed to establish that any licenses have been granted, but on the whole we have found independent manufacturers willing to talk about the idea.

The Japanese government is determined that Nippon shall have a local automobile industry, and the progress which has been made towards this end in the last few months is startling. We have in hand considerable information on what has been done and expect to put it into publication within the next few weeks.

The Japanese are no longer imitators only. It may be that last year's Jeremiad from Sir Henri Deterding, of Royal Dutch Shell—that the Japanese might sweep world markets for automobiles within the next 10 years—could turn out to be the true voice of prophecy.

* * *

Infant Industry In a Sophisticated World

SEVERAL visitors to the office this week came to talk specifically about tourist trailers and the prospects of the industry which is making them. There seems to be a tremendous amount of public interest in everything connected with trailers and a good deal of the interest flows out of the desire to be part of a new industry which is in the public eye.

The automobile industry is young enough for many of its present executives to remember when the same things were true of the automobile industry. The whole country is a little more sophisticated than it was 40 years ago, and it is not likely that the old cry of "get a horse" will be succeeded by one of "get a house." To this extent the trailer industry finds prepared ground. Its potential market is in a receptive mood, and the growth of the market will depend almost entirely on improvements in the product.

* * *

Good Men for High Hurdles

WE have had occasion the last few weeks to add another member to our staff. In advertising for applicants we set up some rather high hurdles for recent college graduates interested in automotive engineering. Out of the hundred or more applicants for the position, there are a score or more who seemed distinctly above the average with regard to their possibilities as automotive engineers.

If anyone would like to be put in touch with a selected half dozen of the applicants, we'd be glad to oblige.

* * *

THE Automobile Manufacturers Association has been discussing the question of a suitable public memorial to Roy D. Chapin, late president of Hudson. It has been proposed to build and mark appropriately a mile of highway, signalizing Mr. Chapin's perennial interest in highway progress, and his labors for the cause all over the world.

* * *

Tests and Tests But Not a Test

A LARGE automobile club recently got itself some publicity by setting up a car-testing lane on a well-traveled highway and inviting passing owners to bring in their cars for testing. The resulting publicity claimed that of 1000 cars tested, 60 per cent were faulty in some mechanical particular.

A budding statistician projected this figure to show that it indicated 15,700,200 of the automobiles registered were operating with mechanical defects.

This one about takes the cake, we think, as an ill-advised way of dealing with the problem of safety on the highways.

Picking a thousand cars at random and testing them would give a more accurate figure than the method used by the motor club. When a thousand drivers are asked to come in for testing, the only accurate test is of the driver's state of mind.

The driver who was pretty sure his car was in fair condition mechanically would not be likely to take the time for a voluntary test. On the other hand, the driver who had a feeling there was something wrong with the car would probably welcome the opportunity for a free test which did not obligate him to having any repairs done.

Publicity for safety is an effective deterrent in the hands of intelligent people. Mismanaged and misdirected, it can do a lot of harm. —*H. H.*

Fuels

By Joseph Geschelin

ROUGH estimates indicate that there are about 1500 diesel-powered trucks in operation in the United States, a large proportion of which are concentrated west of the Rockies. In addition, there are between 15,000 and 20,000 industrial and agricultural tractor units with Diesel power.

It is generally expected that Diesel applications will grow at a greatly accelerated rate in the near future and this implies not only a great increase in the market for diesel fuel but also a demand for distribution facilities in practically every section of the country.

Up to now Diesel operators have had to be content with available fuels, generally the furnace oils marketed for use in domestic heating plants. Although it is quite probable that furnace-oil stocks will continue as the primary source of high-speed Diesel fuel, the refiners recognize the need for a better product, better with respect to both cleanness and uniformity, and the trend today is toward a specification fuel featuring above all a definite ignition quality expressed in cetane numbers.

The Independent Research Committee, organized by T. B. Rendel some time ago, has been working diligently on this problem. Its objective is to develop uniform specification fuels suitable for the present high-speed Diesel, and methods of testing and production that will assure uniformity. This is a project deserving the co-operation of both oil refiners and Diesel-engine manufacturers.

Already a number of oil companies, particularly those operating in the districts where Diesels are extensively used, have developed specification fuels and, in fact, some of these fuels have been given brand names to facilitate recognition by the user. In an effort to correlate the present Diesel fuel activity for the benefit of the industry, AUTOMOTIVE INDUSTRIES has been in touch with some 25 large oil companies, and the information contained in this article is based upon returns from some of the larger producers.

Table I lists the fuel oils marketed by some of the large refiners. It covers specification fuels wherever available,

TABLE I
Data on Specification Diesel Fuels

COMPANY	TRADE NAME	APPLICATION	HOW DISTRIBUTED	AREAS OF DISTRIBUTION
Standard Oil Co. New Jersey Pennsylvania Louisiana Colonial Beacon Co.	Essodiesel three grades 208, 211, 230	High Speed Diesel	Tank wagon barrels	New England New York Pennsylvania South Carolina North Carolina Virginia West Virginia Tennessee Louisiana Arkansas
Phillips Petroleum Co.	Fuel Oil No. 2 No. 3	Tractors Road building		Peoria Kansas City Wichita Minneapolis Amarillo
Sinclair Refining Co.	Sinclair Superflame Diesel Fuels 250, 355, 355 Winter	Automotive and Rail Car	Tank car, tank wagon, drums	250 grade East, Southeast, South 355 grade Central and Western
Gulf Oil Corporation	Straight run Diesel Fuel Oil	All		East of Mississippi River and Texas
Union Oil Co. of Col.	Diesel	All	Bulk Station Some Service Stations	Arizona, Colorado Idaho, Nevada, Oregon, Washington, (Alaska B. C., Hawaiian Isles, Bulk only)
Cities Service Co. Massachusetts	Fuel Oil No. 2 Fuel Oil No. 3	All	Truck or Tank Wagon; Drum or Tank	New Haven, Hartford, Boston, Lowell, Taunton, Portland Presque Isle Ponco City, E. Chicago
Tulsa	Fuel Oil No. 3 Spec. Diesel 1 and 2	Limited Distribution	Bulk and Service Stn. Tank Cars	
Philadelphia	Fuel Oils 1, 2 and 3			Phila. district only
Atlantic Refining Co.	2 grades, not yet assigned	Hi-speed Low speed	Tank Truck	Mass., R. I., Conn. N. Y. State Barge Canal, Eastern half Penna., N. J., Delaware, Baltimore
Standard Oil Co. of Indiana	Stanolind	Hi-speed Engines	Tank Wagon and Barrels	Mich., Ind., Ill., Wis., Minn., Iowa. Missouri, N. Dakota, S. Dakota, Kansas Montana, Wyoming Colorado
Sun Oil Co.	Furnace Oil Medium Diesel Fuel Light		Tank Wagon Drum Tank Cars, Drums, Tank Wagon	Philadelphia, Pa. Camden, N. J. Atlantic City, N. J. Newark, N. J. Trenton, N. J. Wilmington, Del. Baltimore, Md. Providence, R. I. Bridgeport, Conn. New York City Westchester County Newburgh, N. Y. Peekskill, N. Y. Syracuse, N. Y. Rochester, N. Y.
Continental Oil Co.	"Conoco" Diesel Fuel Oil Daile Gas Oil Lewistown Dark Gas Oil	Hi-speed Low cetane Stationary Diesels	Tank Car only from Tank Car only from Tank Car only from	Ponco City and Artesia Ponco City only Lewistown, Mont. only
Richfield Oil Co.	Richfield Diesel Fuel Oil Light	All Auto Diesel	From Bulk Plants	62 points in Wash. Oregon, Col. Also some in N. Mex. Ariz., Utah, Nev., Idaho
Shell Petroleum Corp.	"Shell Dieseline"	All Auto Diesel	Drums, some Bulk Stations	"See Map"
Associated Oil Co.	"Associated Motor Diesel Fuel"	All Auto Diesel	Tank Car, Tank Truck	California, Oregon, Wash., Hawaiian isles; also parts of Idaho, Nevada, Arizona
Standard Oil Co. of California	Standard Diesel Oil 27 plus	General Automotive Use		California, Oregon, Washington, Idaho, Nevada, Arizona, Utah, Alaska, Hawaiian Isles
American Oil Co.	Amo Fuels Nos. 2 and 4		400 Branch Warehouses	From Maine to Florida and inland

for Diesels

- - are being sold to specifications by most large refineries.

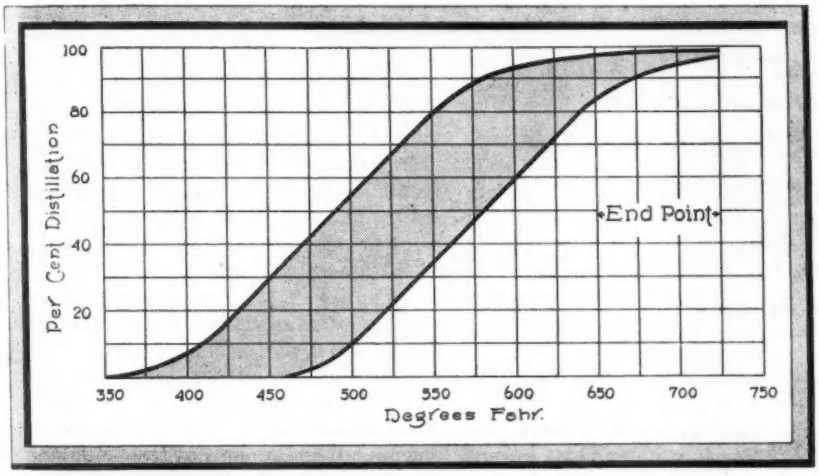
- - are available in bulk and at filling stations over wide areas.

together with fuel oils which are presumed to be suitable for some of the high-speed Diesels. Among other things we show the method of distribution, i. e., bulk, drum, or service station, as well as the trading areas in which these fuels are available.

Table II gives specifications of the fuels listed in Table I as far as information has been made available for publication.

It is of interest to note that Sinclair, Union Oil, Esso Marketers, Standard of Ind., Continental Oil and Atlantic Refining, among those reporting, already are marketing a specification fuel. Shell has had a specification fuel on the market for some time.

Several refiners advised us that their cracking facilities made it undesirable for them to produce a Diesel fuel, and although some of them have been marketing fuel oil, it is not de-waxed and consequently it is unfit for winter operation even in the stationary units in which it has been extensively used. On the other hand, some small refiners who find it possible to make a profit on specialties have been cashing in on the Diesel fuel business on the West Coast.



27 to 38 deg. Baumé distillation curves for Diesel fuels should fall in shaded area. Residue should not exceed 4 per cent and should be liquid at room temperatures. (This graph and caption by courtesy of Cleveland Tractor Co.)

The specifications listed in Table II indicate the urgent need for uniformity in Diesel fuels in view of the increase in demand which is expected to materialize in the near future. Take the case of the Cities Service refineries as an example. Here are three units of the same company marketing fuels under the same general designation, yet the specifications vary with the territory, and the company, in reporting for the purpose of this study, mentions that it has had no occasion for national standardization up to the present time.

Despite the work of the Independent Research Committee and the publication of its reports through the various engineering societies, cetane numbers as criteria of ignition quality have not yet been generally recognized. This is evidenced by the fact that perhaps half of the specifications given in Table II used the designation cetene rather than cetane. Moreover, one of the marketing organizations mentions that it is very much confused by the fact that the users are, on occasion, demanding Diesel fuel with a certain octane rating.

That the problem of specification fuels is not a simple one is evident from the experience of the A. S. T. M. Committee D-2. Last year the committee published tentative specifications listing among others two fuels—1-D and 3-D—for high-speed diesels. These specifications include a rather complex rating for ignition quality, based on a combination of four different criteria, one of which is the cetane number. Replies from research organizations that contributed to this study indicate a serious division of opinion as to the value of these specifications. Some feel that the specifications have met with a favorable response; others, that they would have to be greatly modified to be of value.

As a matter of fact, the tentative specifications produced by Committee

To investigate the present status of fuels suitable for high-speed Diesel engines AUTOMOTIVE INDUSTRIES has just conducted an inquiry among 25 of the largest refiners in the U. S. The specific information found in this article is based upon returns from some of the largest companies in the group.

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D-2 were intended purely as a feeler and not with the expectation that they would be adopted without change. The consensus is that this work will lead to uniform specifications, modified by practical considerations. There is a feeling that two fuels may be specified to cover the entire range of requirements of Diesel engines now on the market; at least the tendency is in that direction.

However, it is important for everyone, particularly the diesel-engine builder and the user, to realize that specification fuels will cost more money. No specification fuel can be made within the range of prices now quoted on straight-run furnace oils, and the figures available on the fuel oils shown in Table I indicate that the price ex-tax may be more of the order of six to eight cents per gallon in tank lots. Even the refined furnace oils, requiring additional operations to reduce sediment and sulfur, will run a cent or more per gallon above the prevailing furnace oil price.

Practical experience indicates, at least according to some petroleum technologists, that although the present-day automotive Diesel is not fussy as to fuel, it does require a certain type of fuel which may not be approximated by the general run of furnace or diesel oils. That is a vital reason for uniformity of fuel oil specifications, quite comparable to the present practice with respect to gasolines. Actually, engine conditions seem to vary sufficiently to warrant a fairly wide range of diesel fuels, each of which may be required for some make of engine and for a particular set of operating conditions. In the opinion of some oil men, this condition may make it rather difficult to solve the problem by just two specification fuels. However, that's a technical matter for the oil men to settle in a scientific fashion.

With the data made available in Tables I and II, it should be possible for the engine builder and the fleet operator to make his selection of a suitable fuel available in his territory. Obviously this is not the final solution but it is the most practical course under present conditions.

All engine builders and some of the equipment makers using Diesel engines have issued fuel recommendations, and these are available to any one interested. Perhaps the best compromise, taking account of both suitability and availability, is that offered by the Cleveland Tractor Co. This concern found that certain specification fuels will give the best performance in its tractors, but it knows that such fuels are not available everywhere and realizes that the customer may not be willing to pay the premium for the best fuel. Consequently it has developed a chart, Fig. 1, which gives a wide band of specification values. The customer can make his own selection and obtain reasonable results from any fuel that falls within the limits of the chart.

From an economic point of view, fuel price will be a determining factor in the future development and availability of specification Diesel fuels. Diesel operators have been taught to consider fuel oil a cheap commodity. They will have to be educated to accept specification fuels even if the prices of these fuels approach that of gasoline. Right now the bulk prices of specification fuels plus tax are very close to gasoline prices.

The point is that if specification fuels are accepted and can be sold at the right price there will be an economic justification for the entry of national marketers into this field, and the engine industry will then be assured of the availability of such fuels almost everywhere in the United States. In fact, one of the largest Eastern marketing organizations announces that it is willing to dispense such fuels at service stations wherever the demand warrants it.

This whole question has a vital bearing on Diesel development, and no time should be lost in accelerating action regarding specification fuels. It deserves active support and the problem can best be solved by cooperative action between the interested parties—refiners, Diesel engine builders, and the large users.

TABLE II

Diesel Fuel Specifications (For Materials Listed in Table I)

FUEL	Cetane No.	Viscosity SSU 100 Deg. F.	Water and Sediment %	Carbon Residue %	Ash %	Flash Deg. F.	Sulphur %	A.S.T.M. DISTILLATION 1 BP	10%	20%	End Point	Gravity	Pour Deg. F.
Standard Oil Co., Ind., "Stanolind"	50-55	40-45	.05 Max.	0.15 Max.	0.01 Max.	160 Min.	0.50	.....	450 550	600 700	.....	.....	.....
Phillips Pet. Co. No. 2	.....	.....	.05 Max.	.....	.....	190	.....	.....	450 Max.	620 Max.	.....	30-32	.....
No. 3	.....	70 Max.	0.1	.....	.....	200	.....	.....	460 Max.	620 Min.	.....	26-32	.....
Sinclair "Superflame" 250	50	33	0	0.02	Trace	150	0.5	420	440	535	600	34-38	0
355	50	35	0	0.2	0	150	0.25	390 410	500	612	675	36-39	5
(Winter) 355	50	33	0	0.2	0	130	0.25	360	422	608	660	37-40	Below Zero
Union Oil "Diesel"	56	41	.....	0.05	.....	200	0.65	.....	.....	.....	.....	32.5	0
Cities Service Co. Mass. No. 2	.....	.....	0.05 Max.	0.05	.....	160	0.75	.....	440 Max.	620 Max.	680 Max.	.....	0
Mass. No. 3	.....	70	0.1 Max.	0.15	.....	200	0.75	.....	.....	620 Min.	.....	.....	10
Tulsa Spec. Diesel No. 3	49	35	.....	0.05	0	185	0.18	312	440	560	626	36.5	—10
Tulsa Spec. Diesel No. 1	55	35	.....	Trace	0	.....	0.073	303	410	581	692	39.6	Below Zero
Tulsa Spec. Diesel No. 2	57	44	.....	0.038	Trace	250	0.12	473	534	622	663	34.9	20
Philadelphia Spec. Diesel No. 3	.....	.....	0.1	0.15 Max.	.....	150 Min.	0.75 Max.	.....	.....	620 675	.....	28-34	15-0
Philadelphia Spec. Diesel No. 1	.....	.....	0.05	0.02 Max.	.....	110-150	0.5 Max.	.....	410 Max.	.....	600 Max.	35-40	0-15
Philadelphia Spec. Diesel No. 2	.....	.....	0.05	0.05 Max.	.....	125-140	0.5 Max.	.....	420 Max.	600 Max.	600 Min.	32-38	0-15
Sun Oil Co. Furnace Oil Med.	.....	28-34	0.05	0.1	0	125-190	0.15 Max.	355-380	440 Max.	620 Max.	650 Max.	34-39	5 Max.
Diesel Oil Light	.....	42 Max.	0.1 Max.	0.1 Max.	0.05 Max.	135 Min.	0.15 Max.	375-405	435-460	625-650	695-720	27-32	0
Continental Oil Co.	58	40	Trace	0.02 Max.	.....	200	0.2 Max.	.....	.....	.....	.....	.....	0 Max.
"Conoco" Diesel Fuel Oil Dark Gas Oil	44	35-38	0.05 Max.	0.15 Max.	.....	190	0.5 Max.	.....	.....	.....	.....	.....	0
Lewistown Daily Gas Oil	61	45-55	Trace	0.14	.....	240 Min.	1.0 Max.	.....	.....	.....	.....	.....	10 Max.
Richfield Oil Co. Diesel Fuel Oil Light	.....	35-40	Trace	.....	.....	150 Min.	0.75 Max.	350-430	.....	.....	720 Max.	30 Min.	15 Max.
Shell Petroleum Corp. "Shell Diesel Line"	.....	38	0	.....	.....	150 Min.	0.75 Max.	.....	.....	.....	.....	30-37	10 Max.
Associated Oil Co. "Associated Motor Diesel Fuel"	.....	35	Trace	0.03	0.1 Max.	150	1.0 Max.	430	.....	688	748	30	.....
Standard Oil of California	.....	.....	40	0.02	.....	186	0.57	.....	460	638	.....	29.9	—10

Stanoil in 6 Types Meets Every Need

With the introduction of "Stanoil" by the Standard Oil Co. (Indiana) it is claimed that six grades can now do the work of more than 24 older types of industrial oils. Referred to as the Stanoil Sextette, these new types meet virtually every lubrication and cutting oil need.

Hot Spark for Oil-Burning Engines

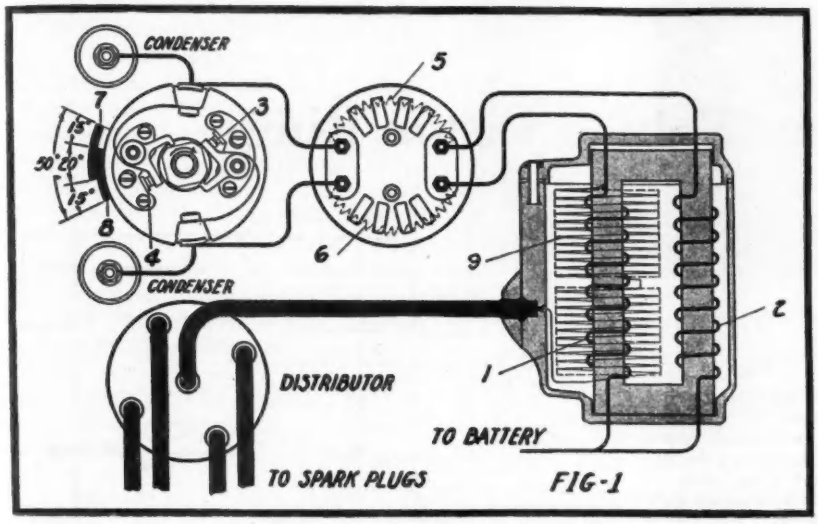


FIG-1

A SPECIAL ignition system for heavy-duty oil-burning engines and for engines using low grade fuels has been placed on the market by the Mallory Electric Corporation, Detroit, Mich. The system already has been adopted as regular equipment on engines of moderate compression ratio in which fuel is supplied by means of an injection system.

The ignition unit is said to produce the hottest spark ever available for the purpose and its advantages lie not only in the ability to fire any kind of combustible mixture rapidly and unfailingly but also in promoting better low speed idling through the ability to burn fuel cleanly at low speed.

In operation, referring to Fig. 1, contacts 3 close to permit battery current to flow through primary winding 1 and through resistance unit 6. Magnetic lines are built up in the transformer core in the direction indicated in Fig. 2. Later, contacts 4 close, permitting current to flow through winding 2. It will be seen that windings 1 and 2 are wound so as to set up opposing magnetic flux. When both circuit breakers are closed, the magnetic lines under the core of the primary 1 and the magnetic lines under the core of the winding 2 oppose each other, as indicated in Fig. 3. Contacts 3 are now opened, but contacts 4 remain closed. The magnetic lines set up by winding 2 cease to travel through the air, as indicated in Fig. 3, and take the course indicated in Fig. 4, cancelling or reversing the magnetic lines that were set up by the primary winding 1. This reversal causes a very rapid change of flux within the secondary coil 9. This change of magnetic flux is from a positive maximum to a negative maximum, giving a spark not only of intense heat, but of twice the duration of the spark from an ordinary spark coil.

The dwell of the contacts is indicated in black at 7 and 8. The primary winding closure is indicated at 8. Contacts 3 close. Then 15 deg. later, contacts 4 close, as indicated at 7. Both contacts

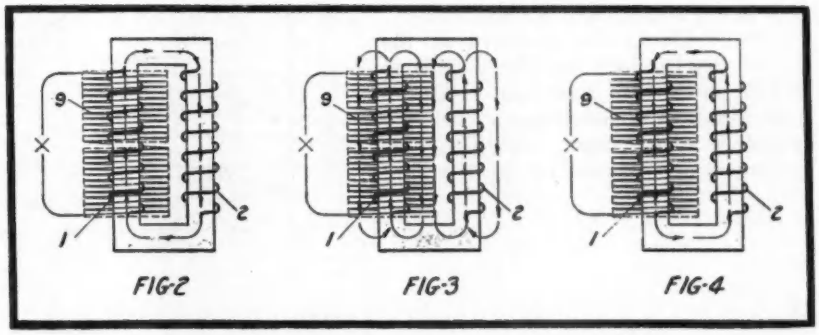
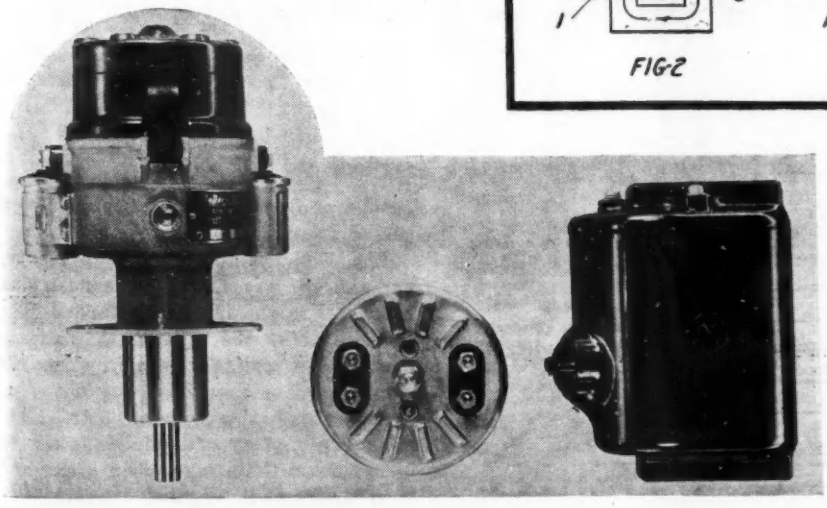


FIG-2 FIG-3 FIG-4



connect both of the windings into the circuit and keep them closed for 20 deg., as indicated. Then, 15 deg. later, contacts 4 open. It can be seen that con-

(Turn to page 131, please)

At the left are views of the distributor unit, resistance and coil

The Forum

Gas Pressure Behind Piston Rings

Editor: AUTOMOTIVE INDUSTRIES

Research at the University of Minnesota by Prof. A. R. Ford and the writer, confirms the statement of Mr. Otto Halling (see AUTOMOTIVE INDUSTRIES, March 7, 1936) concerning the gas pressure behind piston rings. Balanced diaphragms were mounted in the moving piston of a horizontal gasoline engine so that a complete record of the gas pressures in the grooves behind the rings during a working cycle could be obtained. Fig. 1 shows a series of indicator cards constructed from data obtained from the balanced diaphragms and indicates the cylinder pressure, and the gas pressure in the 2 upper ring grooves. The rings and grooves were in worn condition and when these pressures were taken and it is evident that both the first and second rings exert excessive pressure against the cylinder walls, because of the gas pressure behind them. When the ring and groove fit are poor, excessive pressures are found behind both upper rings.

Fig. 2 shows the pressure in the same ring grooves on the expansion stroke after they had been trued up and fitted with new rings. With the properly fitted rings, the high gas pressures are confined to the first ring groove and excessive wear may be expected from the top ring only.

Fig. 3 shows the cylinder pressures and the gas pressures in the first ring groove with the ignition retarded. The ring exerts the greatest pressure against the cylinder walls, when the piston is more than half way down its stroke. This also confirms Mr. Halling's explanation of cylinder wear ¾ inches down the stroke when a car had been driven with retarded spark.

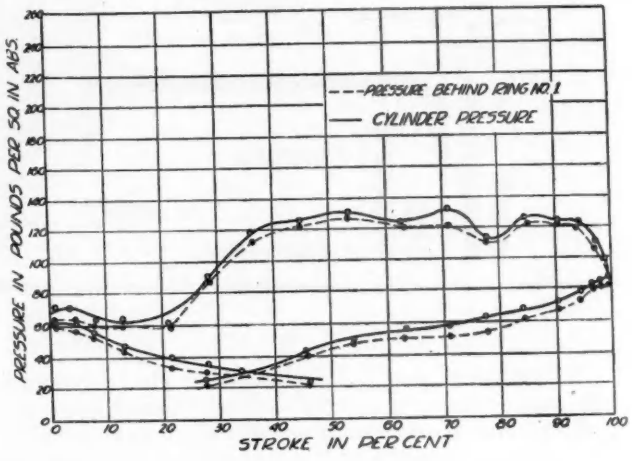


Fig. 3
Indicator diagram of cylinder pressures and pressures in the first ring groove, with retarded spark.

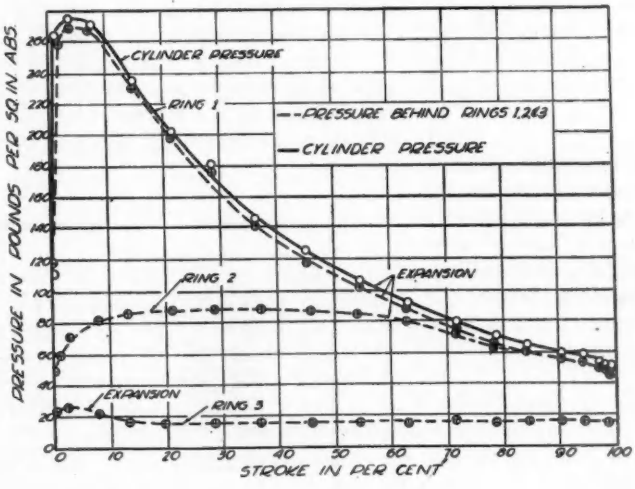


Fig. 2
Indicator diagram of cylinder and ring groove pressures on the expansion stroke with new rings and reconditioned ring grooves.

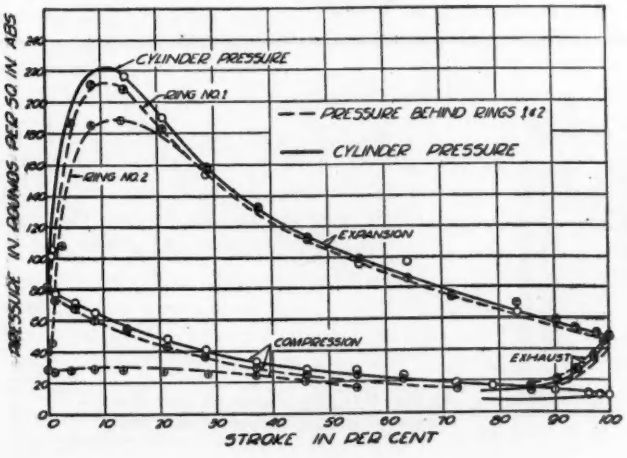
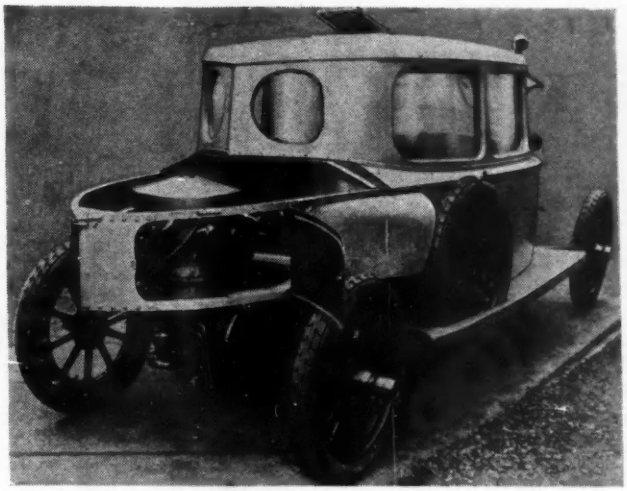


Fig. 1
Indicator diagrams of cylinder and ring groove pressures, with rings and grooves in poor condition.

One very pronounced cause of cylinder wear has received little attention in your columns; that is the matter of dust. In an experimental thesis by K. G. Jones, a graduate student at the University of Minnesota, a cylinder barrel made of nitralloy was worn .006 inches in 20 hours running, when .05 pounds of dust were floated into the carburetor inlet air stream per hour. The average diameter of the dust particles as determined by microphotographs was between .0005 to .00075 inches. Cylinder barrels made of cast iron wore approximately twice as fast as the nitralloy. The dust used was gathered from farm lands where tractors had shown considerable wear in operation and was undoubtedly more abrasive than usual.

All of the cylinders were worn most at the top where the gas pressure in the ring grooves was greatest. The pistons were in good condition, but the rings were always badly worn, indicating that a combination of ring pressure was responsible for the excessive cylinder wear.

B. J. ROBERTSON,
Associate Professor of Internal Combustion Engines.



Photograph shows the North - Lucas experimental car referred to by Mr. Platt in a letter printed in Automotive Industries recently. This car had a self - supporting body, radial engine with vertical crankshaft, independent suspension and other up - to - date features. It was built in the early twenties.

Diesel Records

Editor, AUTOMOTIVE INDUSTRIES:

I wish to call your attention to the statement made under the caption "Diesel Record to Eyston" on page 5 of the May 2 issue of AUTOMOTIVE INDUSTRIES, as follows:

"Captain George Eyston, ace British driver, established what was said to be the first official world speed record for Diesel-powered cars when he drove his Ricardo 12-cylinder Diesel over Bonneville Salt Beds, Utah, at a speed of 158.87 m.p.h., April 30."

On Feb. 15, 1935, at Daytona Beach, Fla., a Waukesha Silver Comet Diesel-powered racing car, owned by the Hemphill Diesel Engineering Schools and driven by Dave Evans, broke the world's Diesel speed record at 125.065 m.p.h., under the auspices of the American Automobile Association. The world's Diesel speed record was formerly held by George Eyston in England at 120.33 m.p.h. The Hemphill School's Waukesha Diesel-powered racer still holds its records for a stock motor, the motor having been without supercharger or any other apparatus for increasing its speed.

About two weeks later, early in March, 1935, Bill Cummings, driving a Cummins supercharged Diesel racer at Daytona Beach, made an official record under the supervision of the A.A.A. at 137.195 m.p.h.

Believing that your article has inadvertently left a wrong impression with your readers, I take the liberty to call to your attention to these former official Diesel speed records.

RALPH HEMPHILL.

We submitted a copy of Mr. Hemphill's letter to the Contest Board of the American Automobile Association and obtained from it the following statement, together with the accompanying tabular history of Diesel speed records. It would appear from this that the A.A.A. does not recognize a class of racers fitted with stock Diesel engines. —EDITOR.

"In the latest revised table of Diesel speed records compiled by the Contest Board of the American Automobile Association, Captain George Eyston of England, who recently established new marks for the mile and kilometer at Bonneville Saltbed in Utah, is credited with 20 world marks, and Bill Cummings is allowed two American records with his Cummins Diesel.

"Cummings' records for the 5-kilometer and 5-mile records he established at Daytona Beach, Fla., in 1935 with the American-made Cummins Diesel, are the only Diesel marks held by an American driver and an American car in the newest A.A.A. listing."

HISTORY OF DIESEL SPEED RECORDS
(Revised April 30th, 1936)

DIST.	DATE	PLACE	DRIVER	CAR	TIME	M.P.H.
1M (F)	6-13-34	Montlhery	G. E. T. Eyston	A. E. C.		120.33
1M (F)	2-15-35	Daytona Beach	Dave Evans	Hemphill-Waukesha Comet		125.065
1M (F)	3- 1-35	Daytona Beach	Bill Cummings	Cummins Diesel	27.05	133.023
5K (F)	3- 1-35	Daytona Beach	Bill Cummings	Cummins Diesel	1:28.075	126.990**
5M (F)	3- 1-35	Daytona Beach	Bill Cummings	Cummins Diesel	2:40.60	112.079**
1K (F)	3- 2-35	Daytona Beach	Bill Cummings	Cummins Diesel	17.36	136.731
1M (F)	3- 2-35	Daytona Beach	Bill Cummings	Cummins Diesel	26.24	137.195
1K (F)	10- 9-35	Brooklands	R. J. Munday	Munday Diesel	23.62	94.70
50K (S)	10- 9-35	Brooklands	R. J. Munday	Munday Diesel	21:09.37	88.11
50M (S)	10- 9-35	Brooklands	R. J. Munday	Munday Diesel	33:55.24	88.44
100K (S)	10- 9-35	Brooklands	R. J. Munday	Munday Diesel	42:10.92	88.38
100M (S)	10- 9-35	Brooklands	R. J. Munday	Munday Diesel	1:08:05.10	88.13
1 Hour (S)	10- 9-35	Brooklands	R. J. Munday	Munday Diesel		88.25
50K (S)	1- 4-36	Montlhery	G. E. T. Eyston	A. E. C.	18:53.42	98.681
50M (S)	1- 4-36	Montlhery	G. E. T. Eyston	A. E. C.	29:37.81	101.25*
100K (S)	1- 4-36	Montlhery	G. E. T. Eyston	A. E. C.	36:36.80	101.83*
100M (S)	1- 4-36	Montlhery	G. E. T. Eyston	A. E. C.	58:16.79	102.95*
200K (S)	1- 4-36	Montlhery	G. E. T. Eyston	A. E. C.	1:12:14.39	103.22*
200M (S)	1- 4-36	Montlhery	G. E. T. Eyston	A. E. C.	1:56:22.04	103.12*
1 Hour (S)	1- 4-36	Montlhery	G. E. T. Eyston	A. E. C.		103.01*
50K (S)	2-14-36	Montlhery	G. E. T. Eyston	A. E. C.	18:52.61	98.75*
500K (S)	2-14-15-36	Montlhery	G. E. T. Eyston	A. E. C.	3:08:37.84	98.62*
500M (S)	2-14-15-36	Montlhery	G. E. T. Eyston	A. E. C.	5:05:12.09	98.30*
1000K (S)	2-14-15-36	Montlhery	G. E. T. Eyston	A. E. C.	6:20:45.26	97.92*
1000M (S)	2-14-15-36	Montlhery	G. E. T. Eyston	A. E. C.	10:12:53.76	97.90*
2000K (S)	2-14-15-36	Montlhery	G. E. T. Eyston	A. E. C.	12:43:55.70	97.61*
2000M (S)	2-14-15-36	Montlhery	G. E. T. Eyston	A. E. C.	20:44:28.49	96.43*
3000K (S)	2-14-15-36	Montlhery	G. E. T. Eyston	A. E. C.	19:18:29.10	96.55*
3 Hours (S)	2-14-15-36	Montlhery	G. E. T. Eyston	A. E. C.		98.79*
6 Hours (S)	2-14-15-36	Montlhery	G. E. T. Eyston	A. E. C.		98.48*
12 Hours (S)	2-14-15-36	Montlhery	G. E. T. Eyston	A. E. C.		98.05*
24 Hours (S)	2-14-15-36	Montlhery	G. E. T. Eyston	A. E. C.		94.99*
1M (F)	4-29-36	Bonneville	G. E. T. Eyston	Ricardo	22.66	158.8702*
1K (F)	4-29-36	Bonneville	G. E. T. Eyston	Ricardo	14.06	159.0990*

**—Denotes Existing American Diesel Record
(F)—Denotes Flying Start

*—Denotes Existing World Diesel Record.
(S)—Denotes Standing Start M—Mile
K—Rilometer.

Variable Timing for

OUTPUT and fuel economy of two-stroke engines could be improved if the timing could be varied in accordance with the speed of operation. One way of accomplishing this is to provide rotary valves just outside the transfer port, the exhaust port, or both. In either case the rotary valve can be made to control either the opening or the closing of the passage, while the remaining function is controlled by the piston in conjunction with the edge of the port. The drive of the rotary valve would have to be so arranged that the phase relation of the valve with respect to the piston motion could be changed by a speed-sensitive governor. While there is no particular difficulty in providing a valve of the type referred to in the transfer passage, the operation of such a valve in the exhaust

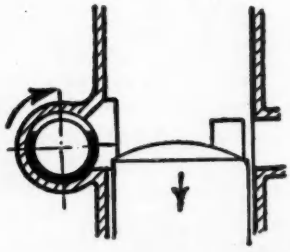


Fig. 1—Rotor controls timing during down-stroke, piston during up-stroke

passage might be expected to involve considerable difficulty. A general survey of the timing possibilities where cylinder ports and rotary valves are used in conjunction in two-stroke engines was made by J. H. Venediger in an article in *Automobiltechnische Zeitschrift*, from which the following is abstracted. While Mr. Venediger surveys the whole field, only cases which have any practical possibility will be considered here. The omissions explain the irregularity in the designations of the systems.

Referring to Figs. 1 and 2 the ports and valves may be combined to function in the following different ways, the expressions up-stroke and down-stroke referring to piston motion:

(*a*) Valve controls timing during down-stroke; port upper edge con-

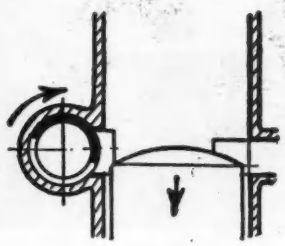


Fig. 2—Rotor controls timing during up-stroke, piston during down-stroke

trols timing during up-stroke (Fig. 1).

(*b*) Port controls timing during down-stroke, valve during up-stroke.

It is, of course, possible to have the port action and the valve action in phase, but the valve in that case would serve no practical purpose.

Timing system (*a*) is applicable to both the scavenging and the exhaust side. If used in connection with the exhaust it results in a lengthening of the effective stroke, while if used in connection with the scavenging ports it results in supercharging, provided, of course, that the respective ports are suitably extended upward, as shown in Fig. 1.

Timing system (*b*) is applicable to the exhaust only; it results in shortening the exhaust period, thereby preventing undue loss of charge.

Systems (*a*) and (*b*) can be combined and then make possible the following among others:

(b_1) End of exhaust controlled by rotor, transfer by ports (Fig. 3, *a* to *c*).

At low speeds the exhaust closes early, possibly before the transfer port closes, but at high speeds it closes late. By suitably changing the timing of the rotor it is possible to decrease the supercharge with increase in speed.

(a_2) Beginning of scavenging controlled by rotor, transfer port lengthened, exhaust timing controlled by port (Fig. 4, *a* to *c*).

Exhaust and transfer ports always close at the same time (fixed timing). With increase in speed the transfer port opens earlier, hence the transfer period increases with the amount of charge to be transferred. The supercharging angle (by which is meant the period in angular measure between the closing of the exhaust and the closing of the transfer passage) is constant throughout the speed range. The only unfavorable characteristic is that the lead of exhaust opening over transfer opening decreases with an increase in speed. As compared with an unsymmetrical fixed timing the only difference is that the exhaust lead is variable. The characteristics of this timing system therefore are:

1. variable timing angles;
2. constant supercharging angle;
3. exhaust lead increasing with decrease in speed;
4. no change in effective length of stroke.

(*f*) Beginning of both exhaust and transfer controlled by rotor, the ports being extended upwardly (Fig. 5, *a* to *c*).

Exhaust and transfer ports always close at the same time, but open earlier with an increase in speed. This results in a constant supercharging angle and possibly in an exhaust-lead angle increasing with speed. An important feature is that it is possible to consider-

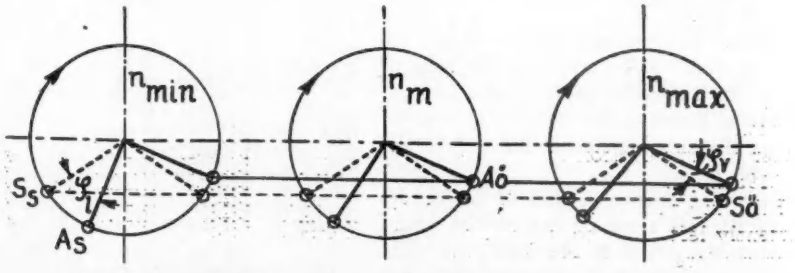


Fig. 3, a to c—Timing diagrams for low, medium and high speeds, obtained with system (b_1) A_o, exhaust opens; A_s, exhaust closes; S_o, inlet opens; S_s, inlet closes

Two-Stroke Engines

Control of valve functions should be automatically adjusted to changes of speed

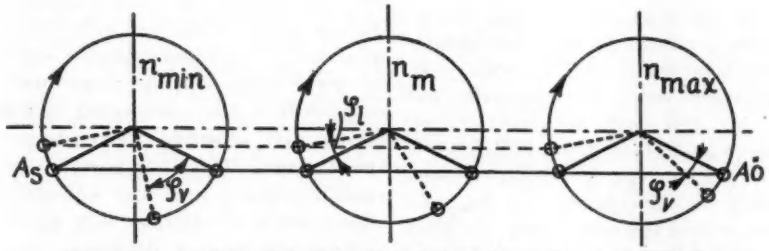


Fig. 4, a to c—Timing diagrams for low, medium and high speeds obtained with system (a_3) Φ_v, lead of exhaust opening over transfer opening; Φ_l, lag of transfer closing behind exhaust closing

ably increase the effective length of stroke at low speeds. The timing angles are widely variable numerically.

(*g*) Closing of exhaust controlled by rotor, opening of transfer ports controlled by rotor (widened transfer ports). (Fig. 6, *a* to *c*).

The widened transfer ports always close at the same moment, and even at the highest speeds after the exhaust ports have closed. The exhaust ports always open at the same time, but close earlier at low speeds. The exhaust opening lead as well as the transfer port closing lag decrease with an increase in speed.

Considered qualitatively only, an ideal timing diagram would have the following four characteristics:

1. Transfer-closing lag decreasing with increase in speed.
2. Exhaust-opening lead increasing with speed.
3. Effective stroke extension increasing with decrease in speed.
4. Exhaust and transfer periods (in angular measure) increasing with speed.

In addition to these four qualitative requirements there is a quantitative one which will be dealt with in the next paragraph. Unfortunately, the four requirements are conflicting, as is brought out by the two most favorable cases (*f*) and (*g*) where both the exhaust and the transfer side have controllable timing. Timing system (*f*) meets requirements 2, 3 and 4, but not 1, as the lag of transfer closing remains constant. Timing system (*g*) meets requirements 1 and 4, but not 2 and 3. Finally, the simplified system a_3 (Fig. 4) meets requirement 4 only partly. As with system (*f*), a constant transfer closing lag is obtained, but elimination of the exhaust rotor is paid for with loss of the increase in the effective length of stroke and with a decrease instead of the desired increase in the exhaust opening lead with increase in speed.

It follows from this that the ideal engine should have rotor control on the exhaust as well as on the transfer side and that omission of the exhaust rotor, generally motivated by operating difficulties, results in a serious impairment of the timing diagram.

On the other hand, the advantages of arrangement a_3 (Fig. 4) compared with a symmetrical timing are of such importance that the arrangement must be considered as practical and, in view of the simplicity of the arrangement, as an important improvement. All in all, an engine of this type is undoubtedly more advantageous than any of the two-piston types, whose fixed timing diagram is not as good as the one which is variable with speed as in Fig. 4, *a* to *c*.

If C is a constant depending on the cylinder dimensions and the width of the ports relative to the circumference, n the crankshaft speed in r.p.m., λ the crank-connecting rod ratio, σ the length of the ports in relation to the length of stroke, and ϕ the crank angle, then in the case of quadrilateral ports we have

$$Z = \int_{-\phi}^{+\phi} f\,dt = \frac{C}{n} f(\phi\,\lambda) = \frac{C}{n} f(F\,\sigma\,\lambda)\ in.^2\,s.$$

where Z is the so-called port area-time integral.

With a constant timing angle the relation between the port area-time integral and the r.p.m. is represented by the hyperbola Z_a. What is desired is a Z curve of inverse form, Z_o. Between these two there is still another possible characteristic, Z_c = constant (Fig. 7).

In all modern high-speed two-stroke engines the port area-time integral varies in accordance with curve Z_a, Fig. 7,

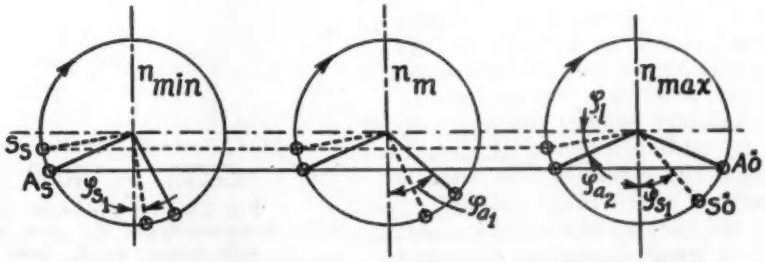


Fig. 5, a to c—Timing diagrams for low, medium and high speeds obtained with system (f). Beginning of both exhaust and scavenging controlled by rotor, so that both are variable

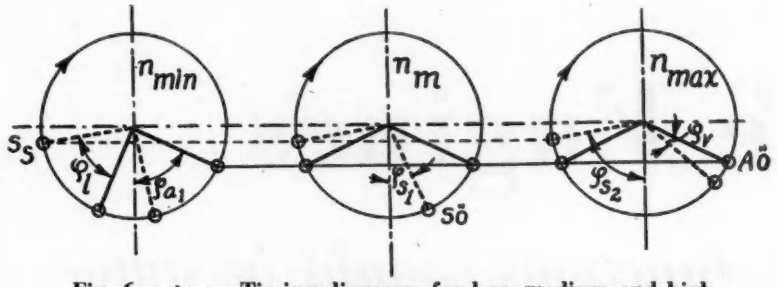


Fig. 6, a to c—Timing diagrams for low, medium and high speeds corresponding to system (g) Opening of transfer and closing of exhaust controlled by rotor and therefore variable

so that it is correct only over a certain narrow speed range. In the case of a two-stroke engine with symmetrical timing diagram the problem of quantitative control consists in starting from this Z_a value and attempting to obtain Z_o or Z_c.

It is impossible to obtain port area-time integral characteristics similar to Z_c or Z_o by a mere change in the timing diagram within practical limits. It is fortunate that quantitative control is less important in engines with unsymmetrical timing diagram; were it otherwise, a two-stroke engine with accurate and adequate scavenging at all operating speeds would be an impossibility. Mere qualitative control does not greatly change the form of curve Z_a, which in the case of a symmetrical timing diagram is a true hyperbola. The greatest change occurs with systems (*f*) and (*g*).

These three systems are analyzed in Figs. 7 and 8, where the maximum exhaust timing angle is assumed to be 65 deg., while the maximum transfer-port closing angle is 90 deg., in order to bring out the limiting values. For the sake of comparison the Z_a (exhaust port area-time integral) and Z_s transfer port-time integral) lines for an engine with fixed timing (exhaust angle, 65 deg., transfer angle, 60 deg.) are also drawn in, these values being about as low as possible.

Fig. 8 shows first of all that the transfer port area-time integrals can always be kept greater than the exhaust port area-time integrals. Secondly, with system (*f*) there is a material increase in the effective length of stroke (up to 15 per cent at 1000 r.p.m., 5 to 10 per cent at 3000 r.p.m., if in the latter case the gas velocity in the transfer passage increases continuously up to 330 ft. per sec.).

System (*g*) differs in that there is no increase in the effective length of stroke but that the supercharging possibility is great throughout the speed range—about 70 per cent at 1000 r.p.m. and still 35 per cent at 3000 r.p.m. In the example this supercharging capacity cannot be taken advantage of. For this reason the transfer port closing angle would be materially reduced, as this will not make high torques impossible at low speeds.

With system (*g*) quantitative control loses its importance, for the reason that within the speed range 0 - 2250 r.p.m. the exhaust and scavenging ports are open together for only a short period of time. The greater part of the charge enters the cylinder while the exhaust port is closed, so that pressure charging can be resorted to.

With system (*f*) on the other hand, quantitative control is important, but when it is applied, the charging port area-time integral is at the same time reduced proportionately except in the special case where two rotors are provided, of which one controls the scavenging passage, closing it alternately, whereas the second rotor serves the separate supercharging passage, which is completely opened each time. Altogether this is a further and very undesirable complication.

As compared with engines having a fixed symmetrical timing diagram, engines operating according to systems (*f*) and (*g*) possess the advantage that during the scavenging period the loss of charge is reduced and the efficiency of scavenging may be increased. In other words, the scavenging operation is equally effective throughout the speed range. This is important, as the specific output and the specific fuel consumption of engines with fixed unsymmetrical timing diagrams are dependent on the speed and show pronounced maxima. Although the engines are supercharged, the scavenging operation is of great importance, for the

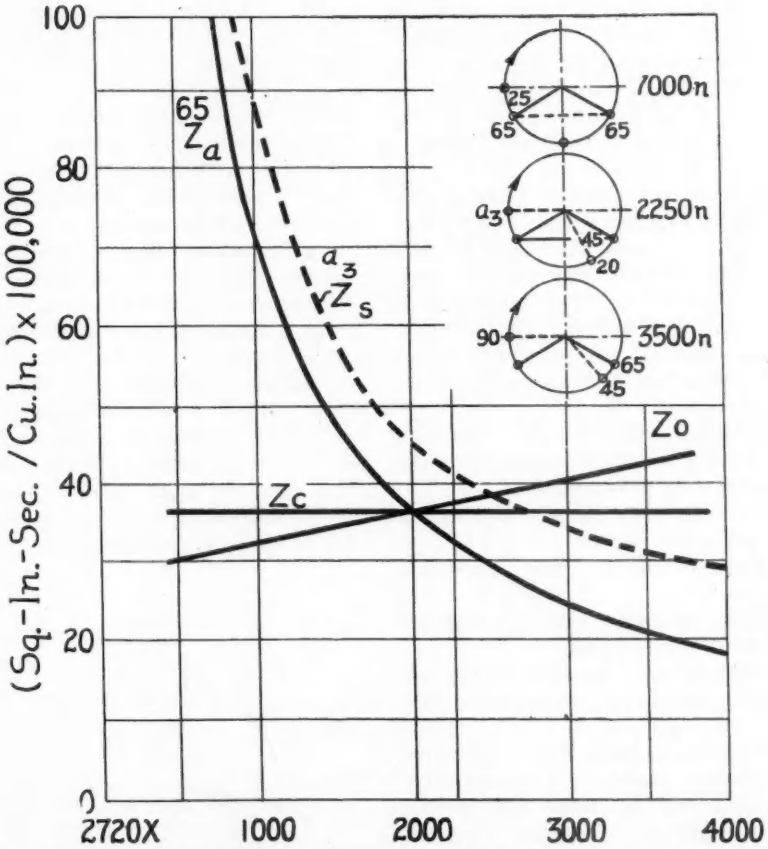


Fig. 7—Port area-time integral curves for various two-stroke engine types Z_s, port area-time integral for transfer port with system a_3; Z_a, port area-time integral for exhaust port with fixed symmetrical timing; Z_c, port area-time integral = constant; Z_o, port area-time integral increases slightly with speed.

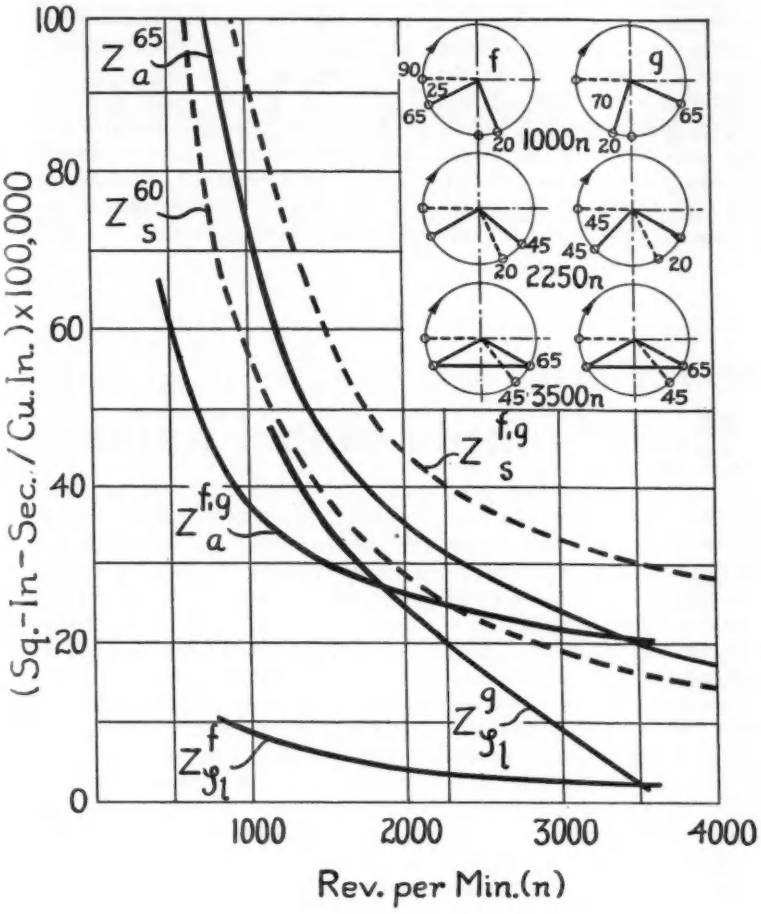


Fig. 8—Port area-time integral vs. engine speed for several two-stroke engine types

Sub figures $_a$ and $_s$ refer to transfer and exhaust respectively, while the ^{60} and ^{65} refer to constant timing angles, and letters *f* and *g* to the timing-control system.

reason that high scavenging pressures must be used to accomplish any material supercharging.

With combined quantitative and qualitative control it would be necessary to give the valve rotors both a rotary and an axial motion, so as to change the port areas. This would give the whole rotor a helical motion. Instead, the rotor might be provided with an elongated triangular port and given a simple axial motion, in which case the distance between the registering edges would determine the qualitative phase of the control. Fig. 9 shows the relations which are characteristic of system a_3. They differ from those of the engine with a fixed unsymmetrical timing diagram in that the port area-time integral characteristic for the transfer port is not of purely hyper- area-time integral characteristic for the transfer port is not of purely hyperbolic form and that the scavenging operation therefore is more favorable. A considerable advantage could be gained by quantitative control of the exhaust port area-time integral in accordance with line Z_c, or, still better, Z_o. As regards supercharging, the conditions are the same as with system (*f*).

In Fig. 9 are shown specific output and specific fuel-consumption curves for a three-port, two-stroke engine with piston-type charging pump (*D-LP*) and the curve of the corresponding expenditure of scavenging medium (volume of scavenging medium used/piston displacement). With timing systems (a_3) and (*f*) and with equal expenditures of charging medium, the specific outputs and specific fuel consumptions are substantially as shown by the corresponding curves. With system (*f*) the specific fuel consumption is practically the same as in good four-stroke engines, and with system (a_3) the values are materially better than with the conventional two-stroke engine. Noteworthy features are the bulge in the horsepower curve and the fact that the specific consumption is practically constant over a wide speed range. In the same figure are shown output and consumption curves of an actually built U-cylinder engine with rotary compressor or supercharged (*U-RP*). At 3000 r.p.m. the consumption of charging medium was about equal to the displacement (scavenging factor 1.0), so that the engine works with considerable supercharge, particularly at moderate speeds. The difference between the specific consumptions of engines of the type just referred to and engines timed

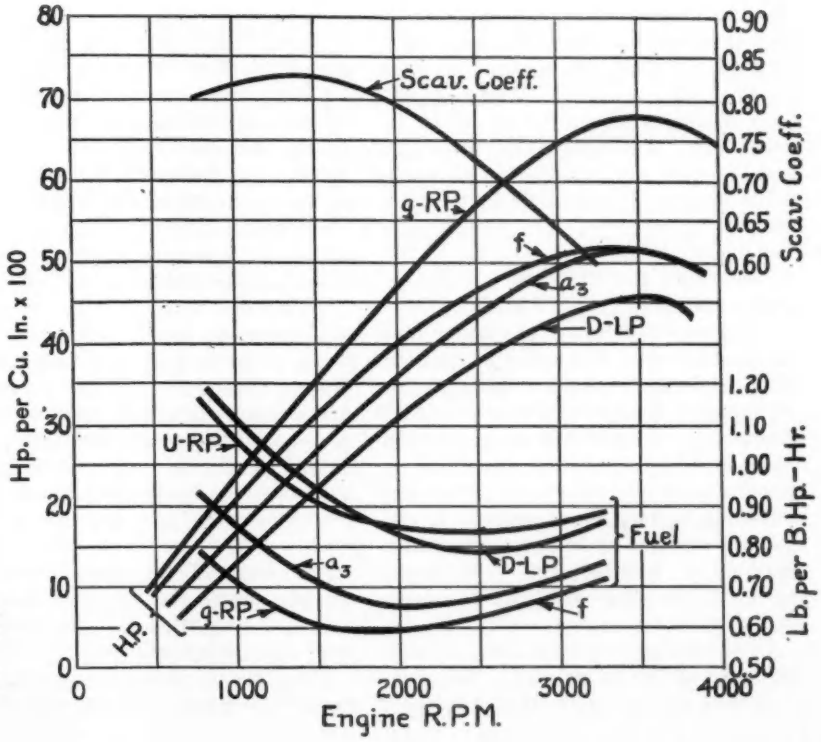


Fig. 9—Specific-horse-power and specific-fuel-consumption curves for various types of two-stroke engines

The scavenging coefficient is the ratio of the volume of air of normal atmospheric density entering the cylinder per cycle to the piston displacement.

according to system (*g*), for equal consumptions of scavenging medium, may be obtained by comparing curves *U-RP* and *g-RP*.

Two-stroke engines with port controlled exhaust and scavenge and specially controlled supercharging ports have long been in use in stationary practice (Sulzer). These engines have an unsymmetrical timing diagram, the transfer ports opening and closing later than the exhaust ports. As the speed of operation varies only slightly the fixed timing diagram meets all requirements, provided the area-time integral has the proper value. In connection with high-speed, two-stroke engines the idea of controlling the exhaust and scavenging ports by means of slide, rotary or piston valves dates back very far.

The above article was abstracted and adapted from an article in *Automobiltechnische Zeitschrift* of June 10 by P. M. Heldt, Engineering Editor of AUTOMOTIVE INDUSTRIES.

New Valve Steel for High Compression Engines

TO meet the more severe valve-operating conditions that have resulted from the use of higher compression ratios and higher engine speeds, Ludlum Steel Co. has developed a series of new valve steels known as Silcrome X. Valves of some of these steels are being used on several 1936 passenger-car models. Silcrome X valves are also being made for truck, airplane, motorcycle and marine engines. There are several steels bearing the trade name Silcrome X; they differ greatly in physical qualities, each being made to suit some particular service requirement. The following information regarding the different grades has been furnished us by the manufacturer.

Silcrome XB is a steel of the ferritic hardenable type and is superior to Silcrome No. 1 in respect to several properties. At 1600 deg. F. its strength is more than 50 per cent greater than that of Silcrome No. 1. In respect to corrosion resistance it compares favorably with the best austenitic steels. On valves other than those of the tongue-and-groove type the tip and retainer neck can be hardened. Valves of this steel are recommended for use in engines for passenger cars and light trucks; they are better than valves of Silcrome No. 1, but their cost is substantially the same. The coefficient of expansion is the same as that of Silcrome No. 1 and the same tappet and guide clearances can be used.

Silcrome X-10 is an austenitic steel of the 18-8 type. It has the advantages over Silcrome No. 1 of a much greater strength at high temperatures—17,500 lb. per sq. in. at 1600 deg. F.—good resistance to corrosion, good work-hardening properties, and fair seat hardness at high temperatures. It cannot be hardened by heat treatment, but hardens mechanically to 45-50 scleroscope. It has the coefficient of expansion of austenitic steels.

Good results have been obtained with Silcrome X-10 valves with the same clearance as used with Silcrome No. 1, but in some cases the tappet clearance must be increased. The tips work-harden well. An additional tip is recommended for overhead-valve engines, but is not needed for L-head engines.

Silcrome X-10 has no critical temperature, hence it has little tendency to warp. This material is recommended for valves for use in heavy-duty automobiles, light trucks and tractors, and light-duty Diesel engines.

Silcrome X-9 has been on the market for some time as a material suitable for heavy-duty valves. It shows a tensile strength of over 20,000 lb. per sq. in. at 1600 deg. F., its corrosion resistance is excellent, it has a high impact value, and it work-hardens, but cannot be hardened by heat treatment. It has the high coefficient of expansion of austenitic steels. The X-9 grade has high silicon and tungsten contents. It forms a very adherent scale, which resists flaking up to 2000 deg. F. With fair lubrication it wears well in the guide. It has greater hot-hardness than most austenitic steels and resists indentation on the seat. Silcrome X-9 is recommended for exhaust valves for aircraft engines as well as for heavy-duty truck and bus engines. This steel is made in several variations, the proportions of the different elements being changed slightly. For best service qualities, valves made from this steel are provided with a welded-on tip.

Die Castings

Die Castings, by Charles O. Herb. Published by The Industrial Press, 148 Lafayette Street, New York, N. Y.

THIS book covers developments in the die-casting art from its origin to the present, among the latest developments dealt with being the process of brass die casting, which has made considerable progress in recent years and cast iron die casting, of which little has been heard as yet. Numerous illustrations and detail descriptions are given of dies, for parts ranging from simple shapes to very intricate forms. In one section, die standards adopted by a leading manufacturer of die-casting equipment are given, which should be of help to the die designer.

Die-casting machines from the earliest to the latest type are covered in the book, which also deals with the die steels required for the different die-casting metals and presents the analyses and properties of the commonly used die-casting alloys.

Dies, which seem to constitute the most important feature of the book, have ben classified according to their most distinguishing characteristics, to facilitate locating a general design or type adapted to a particular class of work. The book contains a great deal of data on rates of production, pressures, alloys used for different applications, etc., and can be recommended to those in need of such information.

IN a recent lecture before the British Institution of Civil Engineers, Charles Eugéne Schneider, managing director of the firm of Schneider & Cie., Creusot, France, illustrated the progress which has been made in metallurgy during the past half century by giving the lengths of round wires whose weight would just be sustained by their tensile strength. This length, he said, had increased from 2.5 miles for puddled iron and 3.3 miles for mild steel to about 15 miles for a special nickel-chromium-tungsten steel.

The Horizons of Business

By Joseph Stagg Lawrence

Ammunition for the Counter-attack

DURING the past week the government carried its control of the banking system one step further. On July 14 the Federal Reserve Board announced that the reserves of member banks would be increased 50 per cent. In explaining this step the Board said:

"This action eliminates as a basis of possible injurious credit expansion a part of the excess reserves, amounting at present to approximately $3,000,000,000 and expected to increase to nearly $3,500,000,000 by the time this action takes effect."

In other words, the Board would have the country believe that this action is taken in order to prevent the banks from going on an inflationary spree which might have serious consequences. This ostensible reason escapes the stigma of political motivation to some extent because a small group of credit fundamentalists have urged control of excess reserves on the ground that the banks of the country would expand their loans solely because they have room for expansion. This is as logical as it is to assert that a man will get as fat as his belt will permit, and for that reason it is always dangerous to have excess notches in belts. The Reserve Board action reduces the excess notches in member-bank belts. It is therefore in the interest of banking health and beauty, a sort of financial girth control by bureaucratic fiat.

What are the facts in the case, and what may be the real motives of this pious Board, all of whose members have only recently been hand-picked by the President, whose chairman, the gifted Marriner S. Eccles, has been among the most vigorous advocates of the corporate thrift-tax passed in the closing days of the last Congress?

What Is a Bank Reserve?

What is a bank reserve, and why do American banks have them? Neither English nor Canadian banks have legally defined reserves, and these banks include the largest privately owned commercial banks in the world. The purpose of a reserve is to enable a bank to meet the demands of its creditors. Every depositor is a creditor. Normally as some creditors demand payment (withdraw funds) others make fresh deposits, with the result that the claims against the bank are matched by new claims, which the bank receives in the form of deposits. These countervailing claims pass through a clearing house and the bank is either credited or charged with the net balance. Obviously, if more funds are withdrawn than deposited the bank must have some resources which it can use to meet adverse balances. That is where the reserves go to work. Most banks keep additional reserves as secondary defences in the form of government or other bonds which may be liquidated on short notice and the proceeds used to meet the claims of depositors.

Legal Reserves

The facility with which bank charters could be obtained in this country gave us more banks than were necessary. Some banks, in the search for business or because they were afflicted with poor management, paid little attention to liquidity. The federal and various state governments found it necessary to stipulate the precise reserves which banks in specified classifications had to maintain. Mind you, the object of the reserve is to assure the ability of the bank to meet the concerted and unexpected claims of depositors. It was a bulwark of liquidity.

Not until the present administration assumed office was a bank reserve ever regarded as an instrument of control. In this particular instance reserves are raised 50 per cent, not because there is danger of a run on banks, but because a group of men of infinite intelligence believe they know how 16,000 individual banks, operating under as many distinct conditions, should conduct their lending operations. Such a motive would reflect the conceit and fatuity of the administrative body. Without excluding the possibility that either or both faults may be present in the Federal Reserve Board, we do not think that this action is a bona fide effort to check "possible injurious credit expansion."

Inflation?

The excess reserves which disturb the Board have accumulated since the present administration took office. Their growth is the result of gold devaluation, the mass influx of foreign gold, the silver-purchase policy and some realization of devaluation profits by the Treasury. Since the reopening of the banks in the late spring of 1933 bank deposits have increased as much as they did during the entire post-war decade of the twenties. That ten-year period of deposit growth is frequently referred to as inflationary. How shall we characterize an equal growth taking place in a period of three years?

Generally speaking, bank deposits are created by bank loans. This is true whether the loan is made to John Smith on the basis of a promissory note or to Uncle Sam on the basis of his bond, which is merely a special form of promissory note. Examine the assets of member banks to discover the possible source of the tremendous growth in deposits. You will find that loans to business have remained practically stationary, whereas loans to the government via the purchase of bonds have increased by an amount which, when modified for deposits resulting from gold, silver and realized devaluation profits, approximates the increase in bank deposits.

The Well-Known Herring

In a period during which business has recovered two-thirds of the way to normalcy, bank loans for business purposes have remained stationary, although the banks have acquired three billions of excess reserves. The Board is now reducing this excess in order to check a specific danger, not the slightest signs of which have appeared during the last three years. The expansion which is causing disinterested monetary students concern is the expansion of the government debt and the resulting prodigious growth of bank deposits. There is no mention of this

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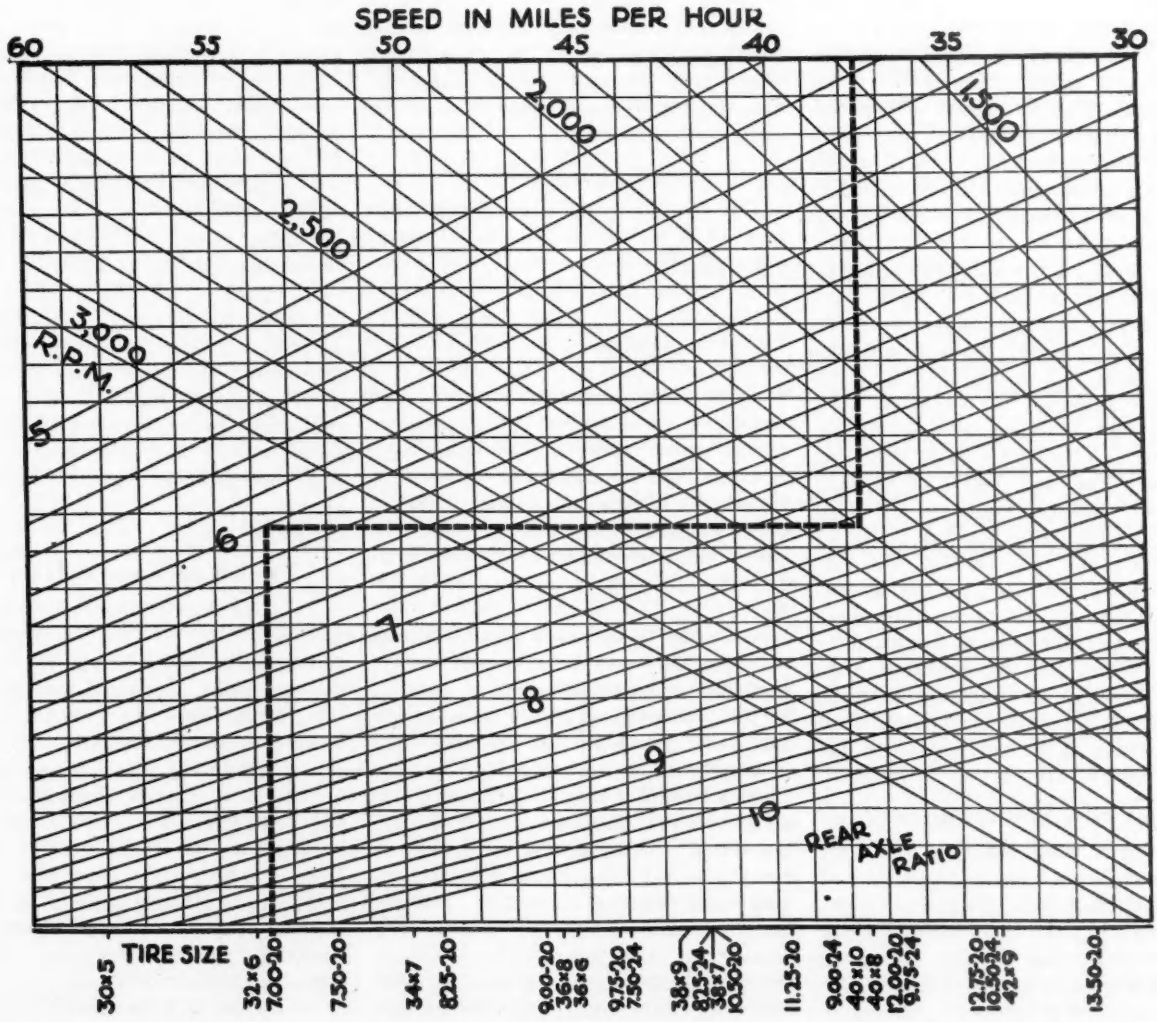
Commercial-Vehicle Speed Chart For Any Given Engine Speed

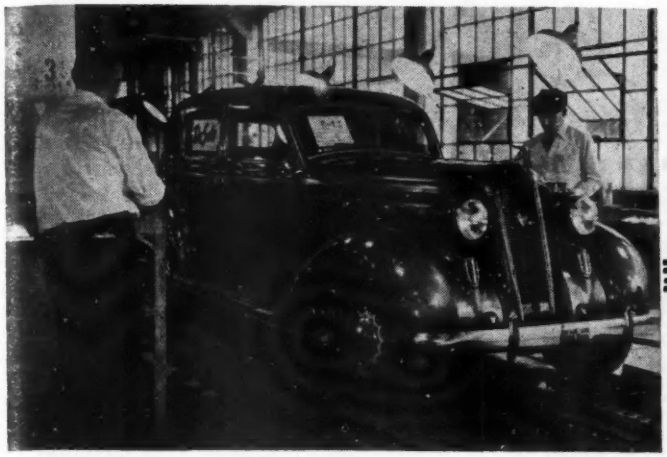
By P. M. Heldt
Engineering Editor, Automotive Industries

THE accompanying chart will serve to determine the vehicle speed for any given engine speed when the tire size and rear-axle reduction ratio are known. The scale at the bottom of the chart represents the effective rolling diameters of the various tire sizes under normal static load. From the point on the scale representing the tire size involved in the problem, one passes up vertically until intersecting the inclined line representing the rear-axle reduction ratio; then horizontally to the point of intersection with the line representing the engine speed, and then vertically to the scale at the top, where the speed of the vehicle in m.p.h. can be read off. The chart, of course, can be used also to determine the engine speed for any given vehicle speed, tire size and rear-axle reduction ratio. To do this, one passes vertically from the point on the bottom scale representing the tire size, until intersecting the inclined line representing the rear-axle reduction ratio and then draws a horizontal line through this point of intersection. Next a vertical line is dropped from the point on the scale at the top representing the vehicle speed, and the point of intersection of this vertical line with the horizontal line previously drawn represents the engine speed. The chart is based on the equation

$$\text{M.P.H.} = \frac{\text{R.P.M.} \times \text{D}}{336\ \text{R}},$$

where D is the effective wheel diameter and R the reduction ratio between engine crankshaft and driving wheels.





PRODUCTION LINES

This picture shows how even the slightest deviation from proper wheel "toe-in" is detected electrically. The steel plate under the right front wheel of the car is pivoted at the rear and mounted on a series of steel bearings which enable it to move from side to side. If the wheel is not perfectly aligned and has either too much "toe-in" or "toe-out" it causes the plate to move sideways across the bearings. This immediately rings a bell and flashes a signal light. The inspector at the nearby desk then marks the alignment deviation against the car's job ticket and the car is routed to a correction line where exact alignment is made.

Cotal Gearing

Two French ambassadors from the Cotal transmission people—Baron de Henseler and Comte de la Hubaudiere—paid us a visit several days ago. We also had the pleasure of driving their four-cylinder Peugeot equipped with the Cotal transmission. As you know, the Cotal is an electro-mechanical geared transmission in which the speed changes are made at the option of the operator by moving a remote control lever at the steering wheel. The clutch is used only in starting from neutral; thereafter, speed changes are made without clutching simply by moving the lever. It takes a little knack to shift smoothly from one speed to another, but it's not difficult to get the hang of it. By speeding the engine sufficiently to develop the required torque, it is easy to shift directly from first to fourth. Reverse is obtained by pulling out a plunger on the instrument board. Incidentally, the Peugeot is a right handsome performer, particularly when you consider how small the engine is.

Fifth Place

Today aluminum ranks fifth among metals in point of tonnage produced and used. Practically all branches of industry employ the light metal in one form or another—in plate, sheet and foil, bar, rod and wire, structural shapes and molding, tubing, sand, die and permanent mold castings, forgings and powder. Its applications are numbered in the thousands, extending from the thin aluminum leaf in photoflash bulbs to massive shovel dippers—from collapsible tubes to dump trucks.

Electric Forum

Westinghouse held a Forum on machine tool electrification recently to acquaint machinery designers with the latest ideas in motors, reducers, and controls. We are told that the Forum was well attended, from which we may deduce that some of these ideas will be translated into machine tool elements for the benefit of the metal cutting industries at large.

Sans Scale

A recent note from Boeing indicates that their Wasp engines are fitted with Enduro, 18-8 stainless steel exhaust manifolds and collector rings. This alloy is said to eliminate scaling and thus provides an excellent safety feature since there is no further danger of fire from the flying hot sparks.

AC Visit

Carrying out a plan started several years ago, AC Spark Plug held its third annual open house affair recently. About 4000 people, many of them members of employees' families, went through the plants. As a memento of the visit, the company has printed a little booklet—"A Visit to the AC Factories"—which is available to all and sundry. As a matter of fact, you will be very much interested in this booklet, as it shows many views of the factory and describes some of the unusual operations incident to the manufacture of spark plugs.

Photoelasticity

We understand that photoelastic studies will be greatly facilitated by the use of synthetic Polaroid discs for the polariscope element. This material is said to give excellent results at less cost than with the natural crystals, which have been used heretofore.

Polishing Wheels

A handy wall chart giving complete directions for setting up polishing wheels has been made up for distribution by General Abrasive. It gives the correct proportion of glue to water, glue heating, preparation of wheels, sizing, etc. Made to hang on the wall in the polishing room or laboratory. We can get it for you. —J. G.

MANUFACTURING MANAGEMENT METALLURGY

A Double Governor

is provided on the Ex-Cell-O injection pump for Diesel engines

IN our abstract of the S. A. E. Summer Meeting paper by C. R. Alden of the Ex-Cello-O Aircraft & Tool Corporation it was pointed out that in one form of the Ex-Cell-O injection pump for Diesel engines a double governor is provided, the quantity of fuel injected being controlled at high speeds by the centrifugal force on governor weights, and at low speeds by the vacuum in the inlet manifold. Because the centrifugal force varies as the square of the speed, at high speeds the force due to the governor weights is sufficient to effect accurate control, but at low speeds this force is very light. On the other hand, there may be considerable vacuum in the inlet manifold at low speeds, provided a throttle is used in the inlet pipe, as is always the case when a pneumatic governor is fitted. Although it may seem a complication to provide both a centrifugal and a pneumatic governor, each operative over only a fraction of the speed range, Mr. Alden asserts that the mechanical complications and the cost of such a compound governor may be less than that of a "simple" governor designed to be equally effective as the compound governor over the whole speed range.

A sectional assembly drawing of the pump with the compound governor is reproduced herewith. Arranged centrally within the pump body *A* is the hub *B* on which the pump-driving gear (not shown) is mounted. On this hub are pivoted the two sets of governor weights, weights *C* serving to time the injection and weights *D* to limit the maximum speed of the engine. Any radial motion of governor weights *C* is communicated to the timing control-arm *E* which acts against the pressure of a helical spring *F*. The initial pressure and rate of this spring are so chosen as to suitably control the timing of injection throughout the speed range. Timing-control arm *E* also acts on cam *G* which limits the quantity of fuel injected.

To the left of the timing-control arm *E* there is a piston *H* located in a cylinder which is in communication with the inlet manifold of the engine. In the manifold there is a throttle valve which is so proportioned that at idling speed there will be a vacuum of about 1 in. of mercury column in the manifold. This vacuum draws piston *H* to the left-hand end of its range of travel, while in the drawing it is shown at the right-hand end. At any manifold vacuum less than the maximum, piston *H* will occupy an intermediate position, being returned by spring *I*.

Piston *H* imparts rotary motion to cam *J*, which is normally contacted by cam roller *K*, so that any change in the position of the cam imparts motion to the fuel-quantity-control arm *L* on which the cam roller *K* is mounted. Control arm *L*, which is shown in the maximum-quantity position, determines the axial position of rotor *M* which controls the fuel quantity delivered, and which is also shown in the maximum-quantity position. The control arm also carries a second cam-follower roller *O* which in the maximum-quantity position contacts the face of cam *G*, the position of which is determined by the timing-control arm *E* in accordance with the engine speed. When roller *O* contacts the fuel-quantity-limiting cam *G*, roller *K* may break contact with cam J, which latter normally determines the amount of fuel injected. This occurs only when the maximum fuel quantity to be delivered by the pump at the prevailing engine speed has been reached. From this it follows that the outline of the face of cam *G* determines the speed-delivery characteristic of the fuel pump.

Governor weights *D* of the maximum-speed governor operate to move rotor *M* into a position of reduced delivery against the force of the high-speed spring *N*, which spring tends to move the fuel-quantity-control arm *L* in the direction of increased fuel quantity, and this movement takes place to the extent permitted by cam *J* which is under the control of the manifold

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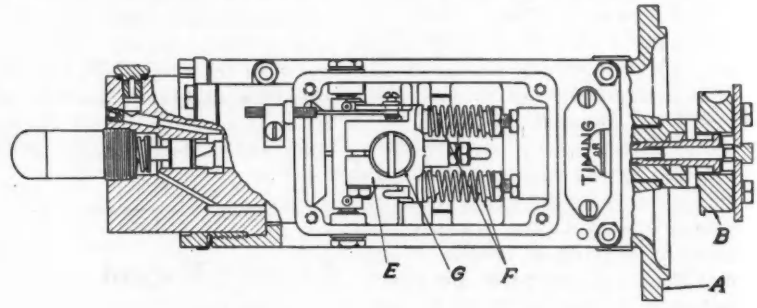
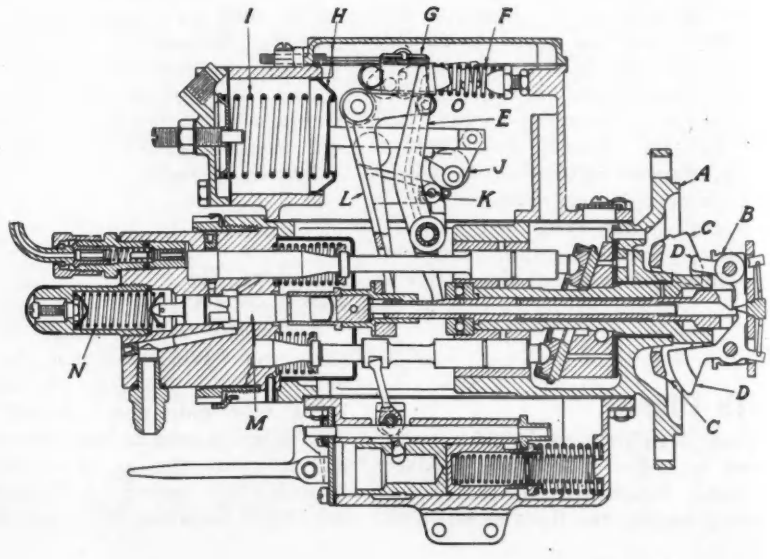




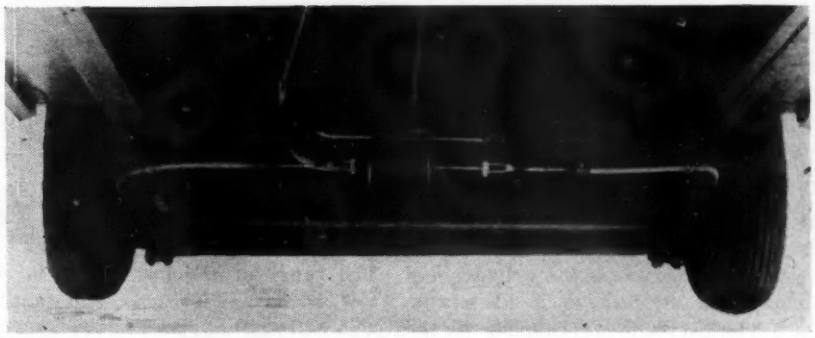
NEW DEVELOPMENTS
Automotive Parts, Accessories and Production Tools

Baker Five-Station Drill Has Many Novel Features

The new five station Baker 60 Multiple Spindle rill features 30 in. ways, a long saddle and a large size head with extreme overhang. High operating efficiency is attained by double feed, delayed reverse, and an automatic change from coarse to fine feed. A positive stop is provided as well as a simplified oil gear pump rapid traverse feed.

With the machine illustrated two tractor links are produced in each cycle. In each piece two holes are core drilled and reamed, and a large hole is rough and finished counterbored.

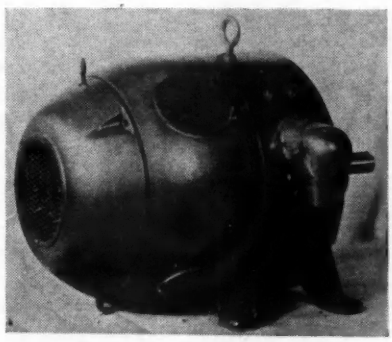
Baker Brothers, Inc., Westlake Ave. & Post St., Toledo, Ohio, are the manufacturers.



Vacuum Power Equipment Co. are making brakes for house trailers

New Westinghouse Motor Is Totally Enclosed

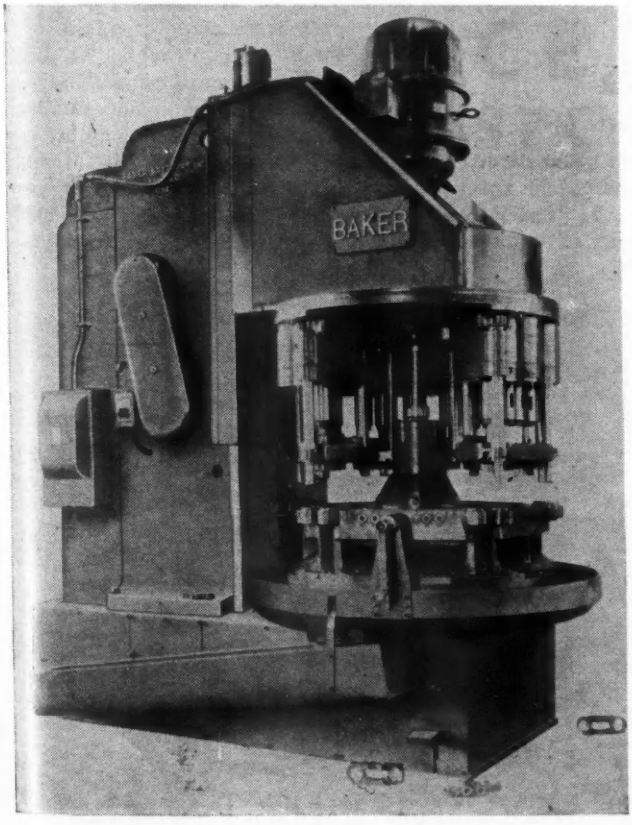
Designed for general industrial service where abrasive and metallic dust is present and where splashing liquids and mild chemicals are encountered, a line of fan cooled totally enclosed direct current motors has been announced by the Westinghouse Electric & Mfg. Co. ranging from 5 to 75 hp. for 115, 230 and 550 volts direct current.



The Westinghouse Type SK motor is fully enclosed

The Westinghouse Type SK motors are built so that all foreign matter is excluded from the interior. Only one cover need be removed to make the commutator and brushes as readily accessible as on a standard enclosed motor.

The design permits mounting the pulley or pinion close to the supporting bearing and the motor may be mounted close to a wall at the pulley end without interfering with the free flow of air.

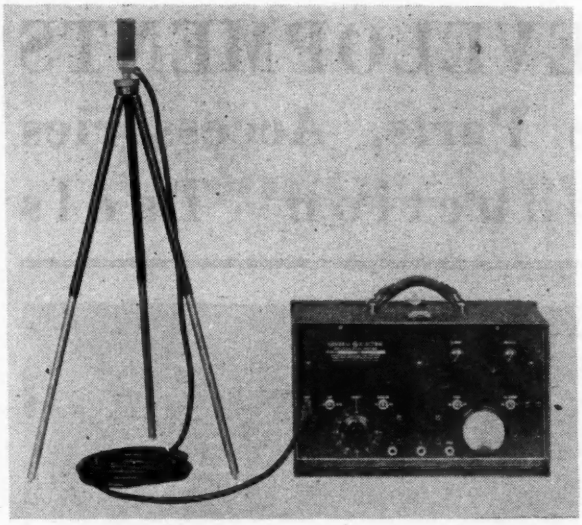


The Baker Bros. drill is a five-station machine

Power Cylinder for Brakes of House Trailers

Equipment for (vacuum) power operation of house-trailer brakes is being manufactured by the Vacuum Power Equipment Co., 1644 West Lafayette Boulevard, Detroit, Mich. Above is shown a unit recently developed and which has been adopted as standard equipment on one make of trailer. Only a single vacuum cylinder is used for the brakes of both wheels; the cylinder is 4½ in. in diameter, the piston stroke is 4 in., and the over-all length of the unit, 5⅛ in. The cylinder floats on a transverse rod secured underneath the floor and is connected to one brake rod, while the piston is connected to the other, and when the cylinder is placed in communication with the inlet manifold by means of the control device, a pull of up to 160 lb. is exerted on each brake rod. The use of a single cylinder for both brakes makes for economy.

A similar unit is available for brakes of the cam-and-lever type, not cable-



Sound-level meter designed by the General Electric Co.

operated. In that case the cylinder and piston each connect to a bell-crank, from which connection is made to the two brake shafts.

These brakes can be operated either by means of the regular brake pedal on the car to which the house trailer is attached or by means of a lever mounted on the steering post. A new type of vacuum valve has also been developed by the company.

G.E. Sound-Level Meter

A new sound-level meter designed to give a quantitative measure of noise independent of the personal element, and at the same time give results commensurate with the sensations experienced by the ear, has been announced by the General Electric Company. The meter was developed to provide performance in accord with the newly adopted A.S.A. standards. The complete instrument, including microphone, tripod, calibrating unit, and batteries, is contained in a compact metal case measuring 15¾ by 9½ by 8¼ in. The carrying weight is approximately 39 lb.

The microphone is a small non-directive, piezo-electric type with practically flat frequency response up to 8000 cycles per second. It is shielded against stray electric fields, and is not affected by stray magnetic fields such as those usually surrounding electrical machinery.

The five-stage amplifier is resistance-transformer coupled and has small-size, low-drain tubes mounted in shock-reducing sockets. A convenient switch permits the selection of either a flat-frequency response to measure sound intensity, or a weighted response which approximates that of the ear at a loudness of 40 decibels. The sound-level meter is calibrated to read in decibels above the standard reference level of 10^{-16} watts per sq. cm. at 1000 cycles. The range of the instrument is 30 to 120 decibels. This is sufficient for noises ranging from those in quiet country homes to sounds that are intense enough to be painful to the ear. Suitable jacks are provided in a 500-ohm interstage circuit to permit the use of auxiliary equipment such as an analyzer or a vibration-velocity unit or special filtering and control circuits as needed.

A receptacle is provided for connecting external batteries where the instrument is to be used on permanent location.

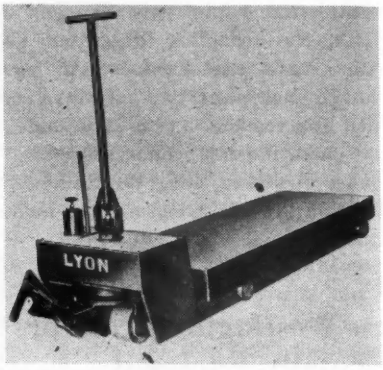
A simple mouth-blown calibrating unit is provided to insure accurate overall field calibration. Factory calibration is obtained by placing the microphone in a standardized sound field.

15-Ton Lift Truck Is Hand Operated

A 15-ton hand-operated hydraulic-lift truck has been announced by the Lyon Iron Works, Greene, N. Y. Specially designed for the handling of automotive stampings, the trucks is believed to have the largest capacity of any hand-operated truck yet designed. A towing hitch is also provided so that it may be towed by a power truck.

The four rear wheels (not shown in the photograph) and the two front wheels are provided with extra large ball bearings. Easy steering is provided by large thrust and radial bearings in the fifth wheel.

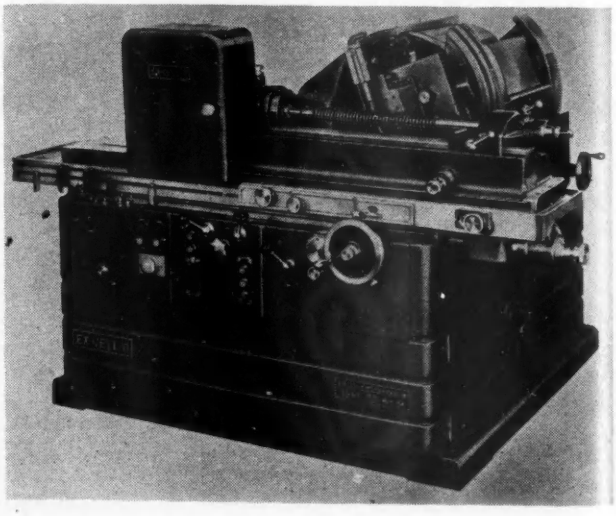
The carrying platform is 30 x 84 in., has a lowered height of 9¼ in. and elevates 3¾ in.



15-ton Lyon Truck

Ex-Cell-O Announces New Thread Grinder

Ex-Cell-O Aircraft & Tool Corp., Detroit, Mich., announces a new Universal Precision Thread Grinder with a capacity for grinding external threads 8 in. in diameter, 24 in. long, on a maximum length work piece of 33 in. between centers. The machine is also adapted for grinding internal threads on work having threads not smaller than 1 in. in diameter, 1 in. long, up to 8 in. diameter, 3 in. long. U. S. S. form, sharp "V," 29 degree Acme, up to and including 60 degree thread form and modified Buttress threads with single,



Unusual precision thread grinder built by Ex-Cell-O

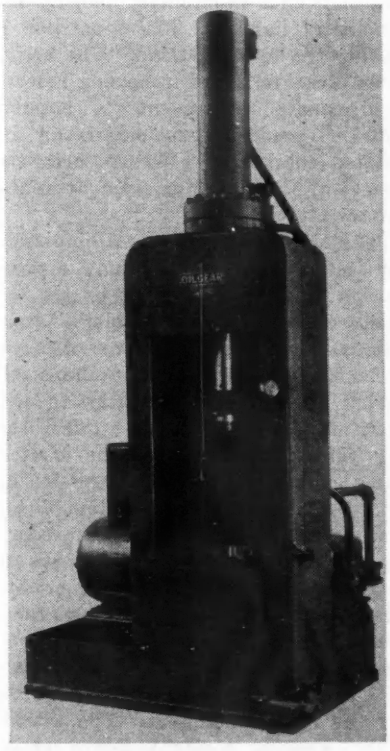
double, triple, quadruple or sextuple threads within the range of pitches from one to 40 can be ground on this machine. Tapers up to two inches per foot included angle can also be ground. A lead tolerance of 0.002 in. per inch when grinding U. S. Standard form threads can be maintained.

The machine is automatic in all its grinding operations except for loading and unloading the work and withdrawing the grinding wheel at the end of the cut. It will grind to a predetermined size setting and then automatically stop feeding; or it may be set so that the table will stop at either end or at any point of its travel.

Oilgear's 35-Ton Broaching Press

A new 35-ton two-column press designed particularly for push broaching operations on rear axle housing tubes has recently been announced by the Oilgear Co., 1403 W. Bruce St., Milwaukee, Wis. Stress concentration, due to tool marks and sharp corners, is said to be virtually eliminated. The frame is of one-piece welded construction.

The semi-automatic hand and foot control levers, mounted in the right side, are easily accessible for adjustment, and control the entire operating cycle, including down and up strokes and lubricant supply. Power is supplied by an Oilgear type "DH-3511" variable-delivery, two-way pump, direct-connected to a 30-hp., 900-r.p.m., electric motor.



35-ton broaching press built by Oilgear Co.

Fixtures on the press can be readily changed or removed to permit a wide variety of other operations.

Hot Spark for Oil Burning Engines

(Continued from page 117)

tacts 3 build up the core of the coil in one direction while contacts 4 reverse the polarity of the coil when contacts 3 open.

The same system is also recommended for heavy-duty engine burning low grade fuels since the character of the spark has been proved to be most efficient in promoting combustion and in keeping the spark plugs clean regardless of the quality of the fuel.

An interesting variation in the system is the design of a horizontal distributor mounting for replacing magneto installations.

Wipe spark contacts are used and the entire head mechanism is provided with seals against the entrance of air, dust, and moisture. Due to the air-tight construction, the head chamber is vented

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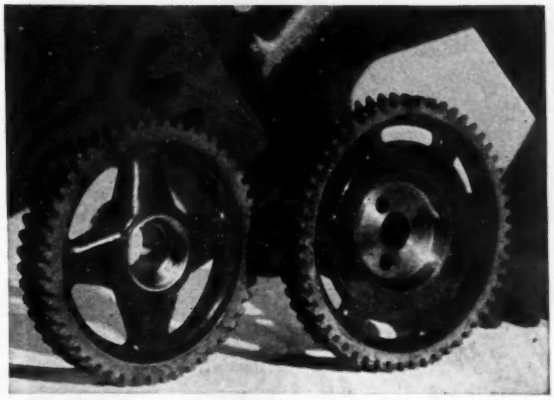

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SPOKE GEARS

Since automobile designers overlook no opportunity for improvements, we feel reasonably assured that their eventual decision will be to employ the Celoron "Spoke" Timing Gear in all engines.

Silence to a degree of audibility sixty per cent below best previous performances, strength providing a factor of safety of the order of five, elasticity of material enhanced by elasticity inherent in design, together with a fifty per cent increase in longevity are the reasons on which we base our expectations.

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by means of a suction line connected to the air cleaner inlet, this arrangement being essential in protecting the contact points and other metallic elements from atmospheric corrosion due to ozone, dust, or moisture.

The principle of an accurately controlled hot spark is said to be particularly advantageous for engines operating on cold carburetion. This would apply equally well to heavy-duty or passenger car engines arranged for cold induction systems or on standard engines in which it might be desirable to use "cold" spark plugs most efficiently.

A Double Governor On Ex-Cell-O Pump

(Continued from page 128)

vacuum, as already explained.

When the maximum permissible engine speed, as determined by the setting of spring *N*, has been reached, the centrifugal force on weights *D* will cause the rotor to move toward the left, thereby decreasing the quantity of fuel delivered and compressing spring *N*, which may result in the fuel-control arm *L* leaving the face of the thrust bearing by which forces applied to arm *L* are transmitted to rotor *M*. It is thus seen that under conditions of maximum speed, rotor *M* is subject only to the action of governor weights *D*, which latter will limit the maximum speed in accordance with the adjustment of spring *N*.

It is claimed that the combined pneumatic-centrifugal governor markedly improves the operating conditions at both ends of the speed range without detrimentally affecting the intermediate range.

At the bottom of the vertical section is shown the fuel transfer pump which is operated from the tappet of one injection-pump element through a rocker lever. This transfer pump can be operated also by hand by means of the lever at the left.

The car in the illustration above is one of America's finest, its builder a user of Mechanics Universal Joints for years. Leading manufacturers of trucks, busses, and other passenger cars use Mechanics Roller Bearing Universal Joints — and why not? These joints stand the "gaff". Their design is simple, rugged, efficient. Every part having any appreciable effect on balance is machined all over. Integral keys, instead of bolts or screws, transmit the driving power. Assembling is simple, lubricating provisions ample, servicing easy. Mechanics Roller Bearing Universal Joints and Shaft Assemblies lend themselves readily to modern motor car design, meet modern requirements for smooth, efficient, reliable operation throughout a long life. Investigate. Write today for data and prices on Mechanics Universal Joints.

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The Horizons of Business

(Continued from page 125)

danger in the Reserve Board statement, no suggestions that deficits will be checked or government borrowing restrained.

The Real Trail

Since the ostensible motive lacks substance we must seek another. The Administration has been charged with extravagance. The resulting increase in the public debt plus gold devaluation and silver purchase constitute powerful potential causes of inflation. With the rise in food prices the Administration finds that inflationary policies are a political liability. The opposition is making the most of them. The action of the Reserve Board in raising reserve requirements to prevent "a possible injurious credit expansion" is an attempted checkmate. We can hear the stooges of Charley Michelson press the counter-attack:

"The last Republican Administration fostered an expansion, nay, a prostitution of this nation's credit for the benefit of Wall Street gamblers, international financiers and princes of privilege. The use of credit in the stock market brought this country to the brink of national disaster. For three long years the people of the United States endured the worst depression in history, and all because a Republican Administration did not have the courage, the honesty and the intelligence to prevent the abuse of the nation's credit. Such an inflation of credit cannot take place as long as the Democratic party remains in office, because it alone has had the foresight and the fortitude to defy the money changers. The action of the Federal Reserve Board is a solemn pledge that, etc., etc. . . ."

Does this suggest a possible motive?